OCTOBER 12, 1944

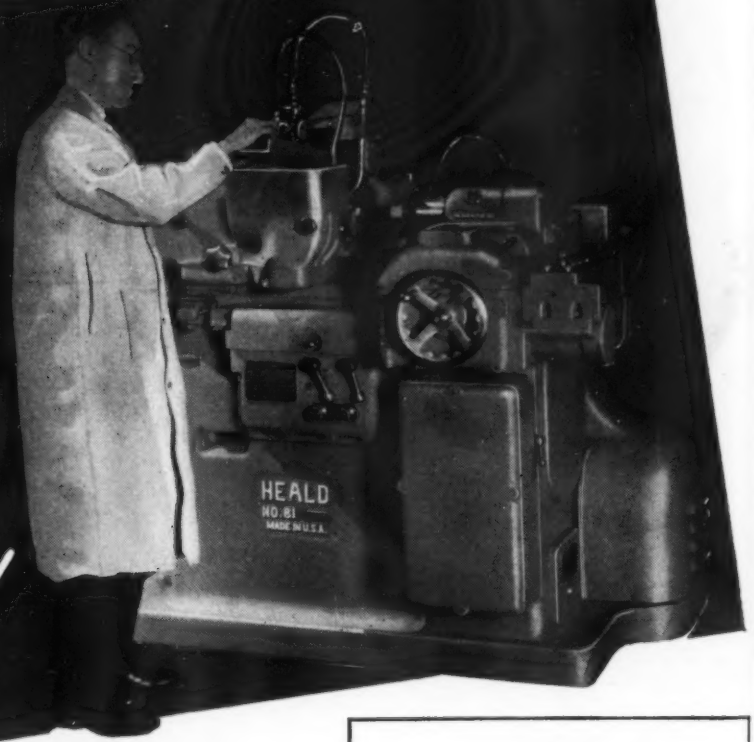
American Machinist

What's Ahead in Welding

ECONOMIES OF PROCESS WILL ATTRACT POSTWAR INDUSTRY

By the Time You've Smoked a Cigarette...*

THE HEALD NO. 81 CENTERLESS grinds 14 to 16 bearing races to within .0003" *Automatically!*



*Your average time in smoking a cigarette—5 minutes. Your Heald No. 81 Centerless on 1" I.D. ball bearing inner races turns out 190 per hour.

Those bearing races could also be valve seats or roll bushings or sleeves ...in fact almost any piece where the bore must be concentric with the outside diameter.

You can turn out all such parts on a Heald Centerless Grinder—at high speed—to close tolerances—*automatically!* The operator simply puts pieces to be ground in the loading chute—then location, grinding, gauging and unloading proceed entirely automatically.

A study of your problem may bring to light several operations that can be done at lowest possible cost by switching to a Heald Centerless Grinder. For the first step in finding the answer, send for our interesting 24 page booklet describing No. 81.

★ ★ ★

And remember, the Heald Centerless is just one of the *Precisioneering* Family of grinding and borizing machines. Heald Engineers with a thorough knowledge of your field are ready to help solve your production problems—for now and after Victory. They make available a wealth of war-proved precision finishing methods and machines—that offer greater output—better products—at less cost.

THE HEALD MACHINE CO.
WORCESTER 6, MASS.

AUTOMATIC GRINDING CYCLE

1. Work automatically loaded.
2. Table carries work to grinding position.
3. Pick-up feed makes rapid wheel contact.
4. Change to proper roughing feed and speed.
5. Change to semi-finishing feed and speed.
6. Work withdraws, trued at truing speed.
7. Change to finishing feed and speed.
8. When size is reached, all units go to rest position.
9. Work is ejected into unloading chute.

HEALD *for precision plus ...economy plus*

Internal and Surface Grinding Machines • Bore-Matic Precision Finishing Machines

TECHNOLOGY DEPT.

American Machinist

PUBLIC LIBRARY
OCT 12 1944
DETROIT

October 12, 1944

BURNHAM FINNEY — Editor and Publisher
W. E. KENNEDY — General Manager
JOHN HAYDOCK — Managing Editor

WILLIAM J. HARGEST — Associate Editor
RUPERT LE GRAND — Associate Editor
BEN C. BROSHEER — Associate Editor
T. C. DU MOND — Associate Editor
BENJAMIN W. CORRADO — Associate Editor
E. J. STRICKLAND — Pacific Coast Editor
GEORGE THOMAS — Detroit Editor
LAURANCE C. MESSICK — News Editor
J. R. BRADFISH — Assistant Editor
R. M. BENNETT — Assistant Editor
J. O. SMITH — Assistant Editor
E. W. MERRILL — Editorial Assistant

PAUL WOOTON — Chief, Washington Bureau
RICHARD N. LARKIN — Washington
KENNETH H. CONDIT — Consulting Editor
FRED H. COLVIN — Editor Emeritus

District Managers: F. S. Weatherby, Boston; J. A. McGraw, New York; D. G. Jones, New York; B. M. Hilberts, Philadelphia; Ray Deen, Chicago; P. F. Pritchard, Chicago; G. V. Patrick, Cleveland; R. H. Anderson, Cincinnati; T. A. Rogers, Detroit.

McGraw-Hill Publishing Company, Inc.

James H. McGraw, Founder and Honorary Chairman; James H. McGraw, Jr., President; Howard Ehrlich, Executive Vice President for Business Operations; John Abbink, Executive Vice President for Editorial Operations; Curtis W. McGraw, Vice President and Treasurer; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation, 330 West 42nd Street, New York 18, N. Y. Branch Offices: Chicago, 520 North Michigan Ave.; San Francisco, 68 Post Street; Los Angeles, 621 So. Hope Street; Pittsburgh, 738-9 Oliver Bldg.; Aldwych House, Aldwych, London, W. C. 2; Washington, Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta.

RETURN POSTAGE GUARANTEED

VOLUME 88 NUMBER 21

AMERICAN MACHINIST. Copyright 1944 by McGraw-Hill Publishing Co., Inc. Published every other Thursday, price 35c a copy. Allow ten days for change of address. Subscription rates—United States, Mexico and Central and South American countries, $5 a year, $8 for two years, $10 for three years. Canada, $6 a year, $10 for two years, $12 for three years. All other countries, $10 a year, $16 for two years, $20 for three years. Entered as second class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A. Cable address, "McGraw-Hill, New York." Member of A.B.P. Member of A.B.C.

A McGRAW-HILL PUBLICATION

PRINTED IN U. S. A.

MAJOR ARTICLES

Welded Fabrication Sure to Attract Postwar Industry..... 91
Non-Metallic Fixtures in Induction Heating.....*Frank W. Curtis* 101
The Economic Reconstruction of Europe.....Facing Page 104
Aircraft Joints Reinforced by Swaging.....*Thomas A. Dickinson* 105
Magnetic Devices Control Roller-Hearth Furnaces.*G. W. Heumann* 106
Accurate Grinding Depends Upon Correct Location....*S. H. Neady* 110
Patrol Craft Mass-Produced on Assembly Lines.....*F. N. Gunn* 119
Novel Tooling Developed to Machine Diesel Cylinder Blocks.... 124

SHORT ARTICLES

Production Control Boards in Each Department..... 104
Standard Test for Lubricating Oil..... 156

PRACTICAL IDEAS

Cutting Serrations in Aluminum Castings.....*Robert W. Mawson* 113
Power Rotary Table With Clamping Device.....*David L. Welty* 114
Improved Method for Testing Squares.....*Fay E. Clarke* 114
Brace Used in a Plate Milling Operation.....*Fred H. Colvin* 115
Carbide-Tipped Tools for Gear Forming.....*Guy Cechim* 115
Set-Up for Cutting Keyways and Grinding Flats..*Ernest J. Heyman* 116
Drills and Countersinks Make Combination Tools.*William H. Case* 117
Hold-Down Clamp for V-Blocks.....*Ronald Eyrich* 117
Holding Snap Gages.....*Roger Paul & Herbert South* 118
Air Cylinder Speeds Drilling of Fuzes.....*A. B. Schuyler* 118

NEWS OF THE INDUSTRY

Gaging Business..... 132a
Inside Detroit..... 132c
Wartime Washington..... 132e
Spotting the Air News.... 132f
Names in the News..... 132g
Obituaries..... 132h

DEPARTMENTS

Editorial..... 89
Reference Book Sheets..... 129
Shop Equipment News.... 133
Parts and Materials..... 148
Trade Publications..... 150
Seen and Heard..... 156

CHANGE OF ADDRESS

★ McGRAW-HILL PUBLISHING COMPANY, 330 West 42 Street, New York 18, N. Y.
★ Director of Circulation: Please change my address on American Machinist
★ From _____
★ _____
★ To _____
★ _____
★ Signed _____

American Machinist Chips

Greetings . . . Repeating our invitation given in the last issue, various and sundry personnel of *American Machinist* will be holding forth at Booth B-111 at the Metal Show in Cleveland, October 16th to 20th. Stop in if you get a chance.

Coming Up . . . The next issue of *American Machinist* will have several interesting features. One will be an article on plastic tooling for aircraft work and another will describe the use of pneumatic devices in tooling. There will also be a continuation of the discussion on how machine tools can be improved, which was started by the swell article in *AM* some months ago by H. T. Johnson of General Motors. Opinions of several prominent companies will be aired . . . late in the discussion, true, but we think very worthwhile because they are the result of careful, considered, expert study.

Here We Go Again . . . By the time you read this, *American Machinist's* Editor and Publisher, Burnham Finney, will have landed in England for a six-weeks' look-see.

As a guest of the British Government, he plans to find out first-hand just what's going on in the way of war activity and reconversion planning.

Some time ago we listed in this column Bill Hargest's suggestions for equipment needed by any potential ocean-crossers-by-boat. Burnham probably won't need this, as he is flying, but no doubt will seize the opportunity to become a legitimate short-snorter.

Incidentally, a recent note from Bill Hargest said that the two small pictures with the story "Clear The Beaches!" (*American Machinist* August 31 issue) were taken with a German camera which had been seized from a Jerry by an Allied soldier and then confiscated the day he was on the beachhead. The officer in charge loaned it to Bill but the pictures were bad—possibly, he says, because he didn't use it to best advantage and besides it was a very cheap article, comparable to a $2 model over here. This item is a bit of trivia in the midst of big happenings, but we always did like the "stories behind the news."

Post-War Planning . . . Fairchild's always interesting magazine *The Pegasus* carries in the October issue an article by correspondent (among other things) Madam Genevieve Tabouis, describing how the Nazis are planning for a third World War. We just thought you might want to know about this and perhaps put those armament blueprints away in a good safe place in case some future Hitler starts acting up again. Estimated starting place, South America.

More Post-War Planning . . . A certain Bar Association in the East (legal, not beverage) recently went through all sorts of agony in the process of convicting five members for embezzlement. From now on, as we get the story, members of the Association will be assessed $20 a head per annum to cover any future embezzlements.

Nothing like confidence in the future.

Anniversary . . . Belated congratulations to *Link-Belt News*, which noted its 10th Anniversary this past August.

Progress . . . The Cooper-Bessemer Corporation, prominent builders of engines and compressors for marine and industrial uses, have made great advances in developing cast crankshafts. The benefits to be realized include worthwhile savings in critical steel and in the conservation of time and skilled labor.

Nothing New . . . Sam Beall, editor of *Report From Cincinnati Milling*, has requested (and received) permission to reproduce a page from the April 16, 1944, issue of *American Machinist*. He wants it in connection with a forthcoming story on high-speed carbide milling and its ancestry. "With data including 500 rpm, 458 ft. per minute, 30½ in. per minute," says Sam, "the page reads as though it might have been written yesterday."

From the Mailbag . . . Here are more comments from readers on the value of the advertising pages in *American Machinist:*

"I have read American Machinist *for a good many years, and have always received a great deal of benefit from the advertising section. It seems to me that advertisements in an up-to-date paper keep one posted on the new trends as much as any one thing." Charles W. Harrold, Chief Engr., Harris Seybold Potter Co., Cleveland, Ohio.*

"I am happy to say that the advertisements in American Machinist *are a valuable source of information to me in my present position in the constant search for new developments in materials, facilities and equipment." Nils H. Lou, Factory Mgr., The Glenn L. Martin Company, Baltimore, Md.*

"Frankly, I do not have as much time for reading as I did a few years back. However, I do read the advertisements in American Machinist; *this is one of two publications that I regularly read. I found that a great deal can be learned from the many advertisements in your publication. From them I get a fairly complete picture of new equipment and tools that are being offered and also many ideas which help me speed up production in my own plant." Edw. F. Bahan, Vice Pres. & Gen. Mgr., Bahan Textile Machinery Co., Inc., Greenville, So. Carolina.*

BEVEL GEAR DRIVES — TO *Victory*

U. S. MARINE CORPS PHOTO

Gleason-cut spiral bevel gear drives for military trucks

ALL 4 WHEELS DRIVEN BY SPIRAL BEVEL GEARS

Military trucks . . . with all four wheels driven by Gleason-cut spiral bevel gears . . . are helping to make the cry, "too little, too late," a thing of the past.

Power drive on front as well as rear wheels gives these vehicles the traction to overcome the obstructions of deep mud, steep grades, and rough, shell-torn ground . . . the ability to move men and supplies cross-country directly to the battle front.

In handling the load extremes encountered in this type of transport, the driving gears must take terrific punishment. Because they possess the required accuracy, load capacity, and toughness, Gleason-cut spiral bevels are universally used for the final right-angle drive in these applications.

Today, Gleason machines are engaged in precision manufacture of spiral bevel gears for military trucks and other materiel of war. To-morrow they will be available to bring improved performance to the products of a world at peace.

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.

Rotary

This simplified sketch shows the part and the milled diameter indicated in color. Note the projecting lug; that's why this diameter is finished by milling.

Keep on buying WAR BONDS

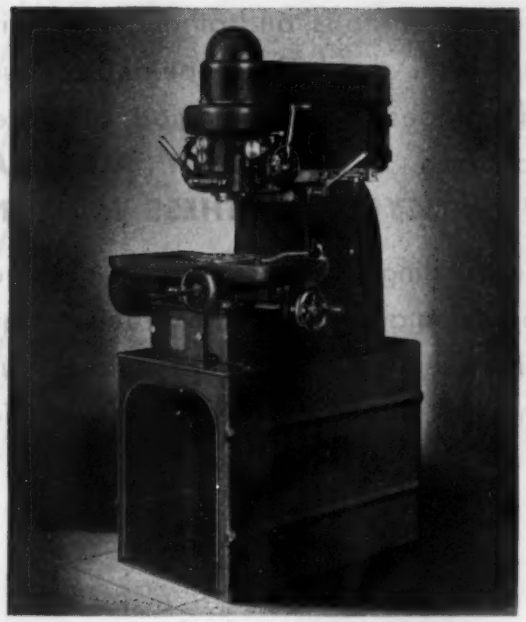
THE CINCINNATI M

MILLING MACHINES

milling 8 3/8 I.D.

THE 0-8's WITH ROTARY TABLES ARE NATURALS FOR THIS TYPE OF JOB

The part is an aluminum oil guard, and the operation consists of milling an 8⅜" inside diameter with a small end mill. The entire setup, on a CINCINNATI 0-8 Vertical with Power Rotary Table, assures fast, accurate, economical production. Even the routine is simple: Load, lower spindle quill, engage power feed and mill, raise spindle quill, unload. And while the milling cut progresses, there's plenty of time for the operator to perform other duties. ¶ The following machine features go a long way toward economical rotary milling: Spindle speeds 150 to 1300 rpm. Eight power rotary table feeds. Hand adjustments to positive stop. Hand longitudinal adjustment through sliding table beneath rotary table ¶ This equipment has proved its worth in accelerated war production, and will be equally useful for milling many parts for civilian products. Talk over your milling problems with our Application Engineers.



CINCINNATI *No. 0-8 Vertical Milling Machine with Power Rotary Table. For complete information, write for specification catalog M-1199. For a brief description of this machine, look in Sweet's Catalog File for Mechanical Industries.*

CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

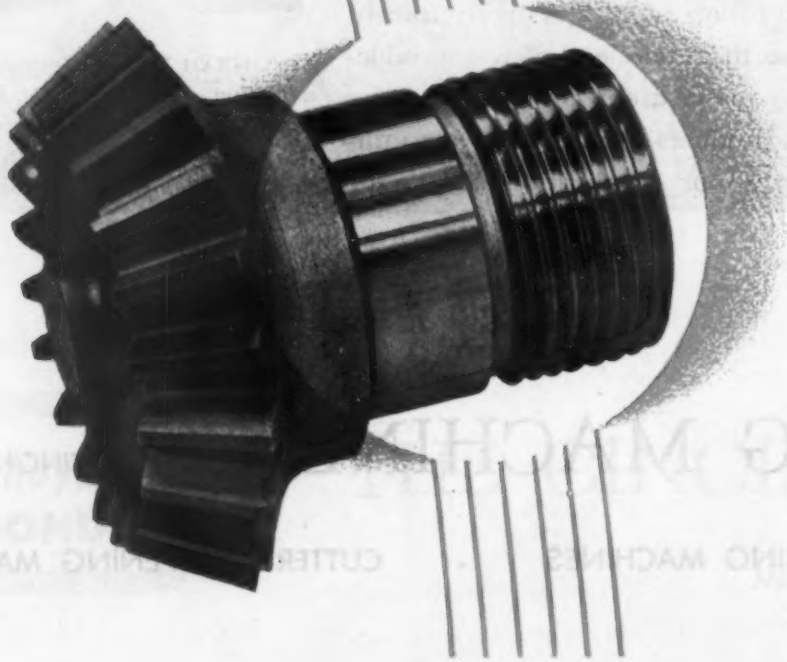
BROACHING MACHINES • CUTTER SHARPENING MACHINES

Multi-ribbed wheel

We are now equipping Jones & Lamson Automatic Thread Grinders for grinding threads and other forms, with a multi-form wheel. The scope and productive advantages of this method are greatly increased by the **FULLY AUTOMATIC WORK CYCLE OF THESE MACHINES.**

The grinding wheel is diamond dressed by an Automatic Multi-form Trueing Device; consequently an accurate, free cutting wheel is obtained, and either resinoid or vitrified wheels can be used. With this same Trueing Device, the **20-INCH DIAMETER WHEEL** can be dressed for three different methods of multi-ribbed wheel thread grinding, as well as for many varieties of plunge-cut form grinding.

The fully automatic work cycle of Jones & Lamson Thread Grinders means greater production and greater profits. Consult us for recommendations and detailed information. Inquiries will receive our prompt attention.



thread grinding...

Fully Automatic Work Cycle—

Including the Diamond Dressing of the Wheel

THREAD SPECIFICATION

1-3/16" — 12 N. S. — Class 3

MATERIAL

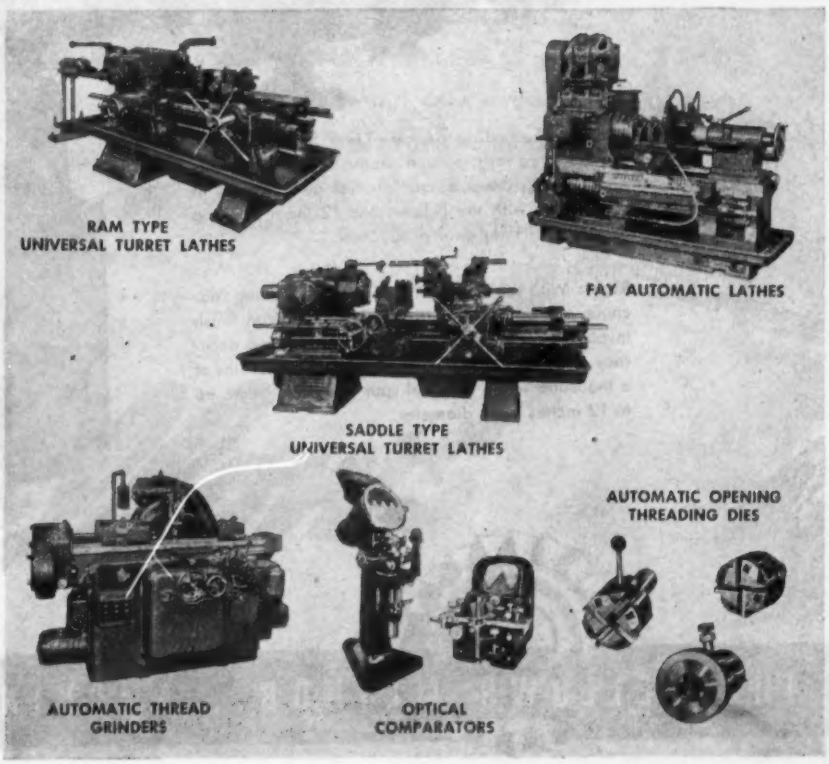
SAE — 4620 — Heat treated

MACHINE CYCLE

29 seconds per piece — 20 pieces between wheel dressings.

WHEEL DRESSING CYCLE

35 seconds. Controlled by electric counter, thus maintaining fully automatic work cycle.



JONES & LAMSON
MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

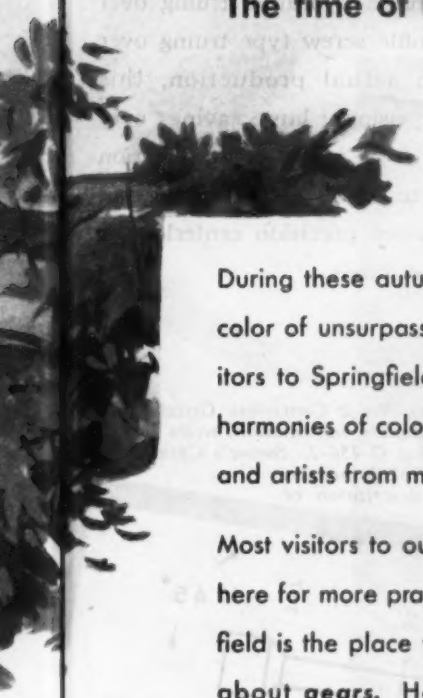
Above: The Fellows 6A-type Gear Shaper, especially adapted for precision production of both spur and helical, external and internal gears. Used in conjunction with the Fellows No. 12 Gear Shaving Machine for finer gear production.

Right: With the Fellows No. 12 Gear Shaving Machine, any operator, regardless of touch, can finish involute gear teeth to hitherto unapproached accuracy. This precision tool removes stock in "tenths of a thousand" from external spur or helical gears up to 12 inches pitch diameter.

THE FELLOWS METHOD... MACHINES AND TOOLS FOR

AND MELLOW FRUITFULNESS"

The time of Harvest is come . . . and in the Fellows Plant, plans are maturing which will bear fruit in finer gears for all industry.



During these autumn days, a pageantry of color of unsurpassed beauty welcomes visitors to Springfield, in the Vermont hills . . . harmonies of color that have inspired poets and artists from many lands.

Most visitors to our plant, however, journey here for more practical reasons. For Springfield is the place where men come to learn about *gears.* Here is the home of the "Fellows Method" of gear production, and of a group of specialists, who for almost 50 years have devoted their talents and skill to the development of better equipment for making gears.

The "Fellows Method" of cutting, finishing and testing gears is now generally recognized as standard in the industry—offering as it does the most flexible and complete equipment for all phases of gear production.

We especially recommend a pilgrimage to Springfield for those technicians who are planning post war products, which it is to be hoped will soon be released for the enjoyment and betterment of all mankind. If you cannot come just now, write today for your copy of "The Fellows Method". Address: The Fellows Gear Shaper Company, Springfield, Vermont . . . also 616 Fisher Bldg., Detroit, Mich. and 640 West Town Office Bldg., Chicago, Ill.

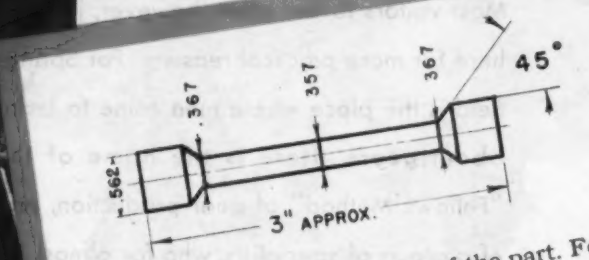
Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

SO TENSILE TESTS

Under ordinary circumstances, few methods engineers would question conventional shop practice for removing .205" on the diameter of a short bar, but this was not an ordinary circumstance. The parts are specimens for tensile tests, and handling them posed a real problem because they had to be exactly the same state physically and metallurgically after machining. ¶ Curiously enough, grinding proved to be the best solution. However, the stock removal is about *10 times* the usual allowance, but the CINCINNATI Centerless with FILMATIC Spindle Bearings has the stamina for such work. To handle the job, Cincinnati Application Engineers developed the equipment shown on the opposite page, applied to a No. 2 Centerless Grinder. ¶ The extra equipment included: 1) Special infeed work rest with loading fingers. 2) Motor driven automatic infeed attachment, arranged for single cycle operation. 3) Profile hydraulic truing over grinding wheel. 4) Profile screw type truing over regulating wheel. In actual production, this equipment effected surprisingly large savings over conventional methods. ¶ Cincinnati Application Engineers will be glad to discuss your present and future plans which involve precision centerless or centertype grinding operations.

Left: CINCINNATI *No. 2 Centerless Grinding Machine. For complete information, write for specification catalog G-456-2. Sweet's Catalog File for Mechanical Industries contains a brief description of this machine.*



Sketch shows the dimensions of the part. Four tapering diameters are infeed ground from the solid cylinder. Metal removal at the center of the piece is .205" diameter reduction.

Keep on buying
WAR BONDS

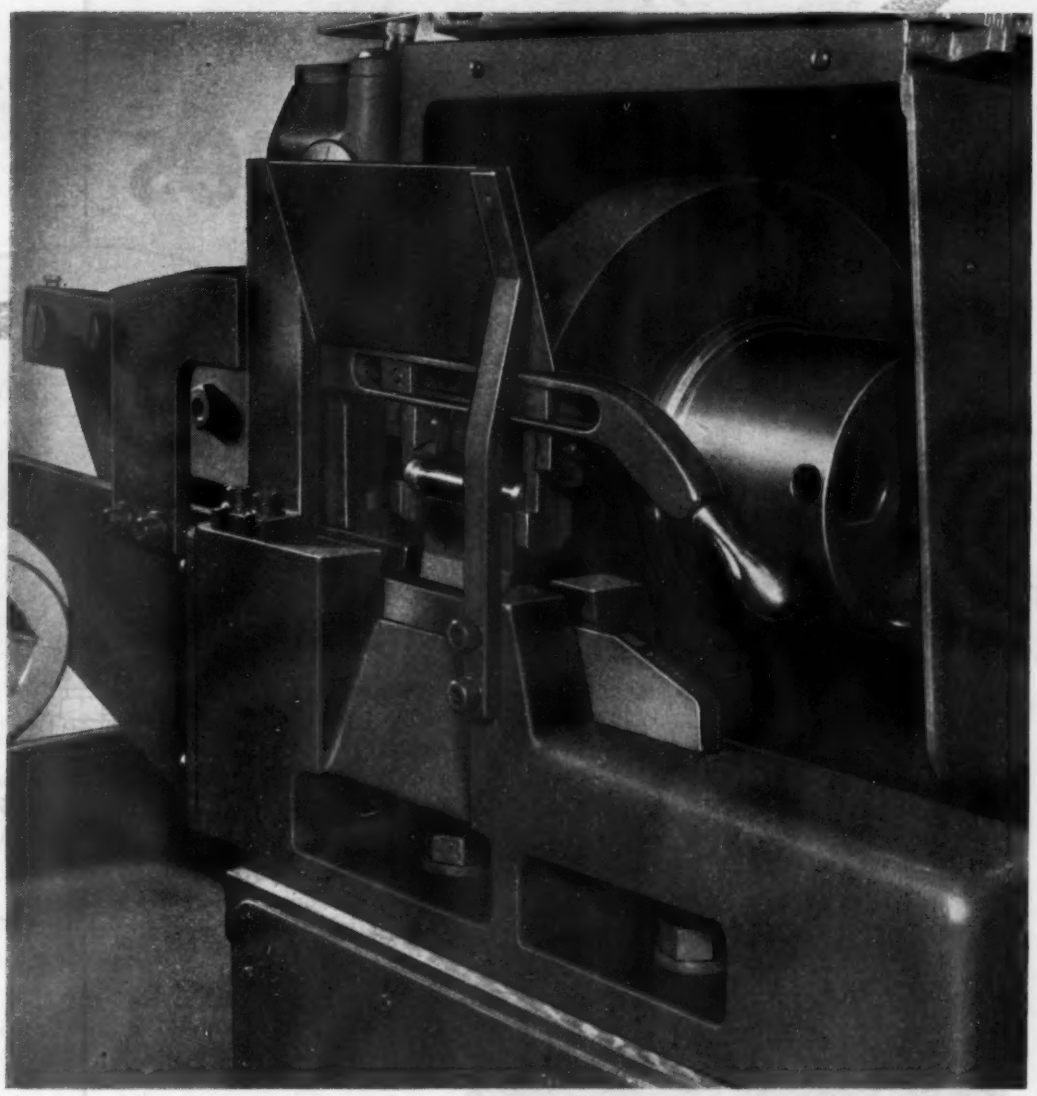
CINCINNATI

CENTER TYPE GRINDING MACHINES

WILL BE TRUE

.205" stock is ground off on a Centerless

CINCINNATI



GRINDERS INCORPORATED

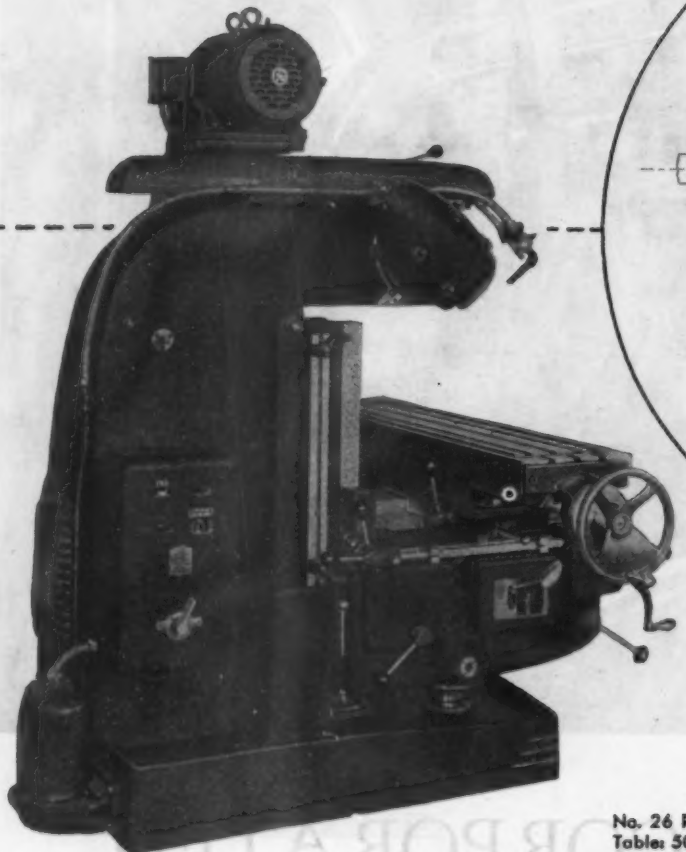
CINCINNATI 9, OHIO, U. S. A.

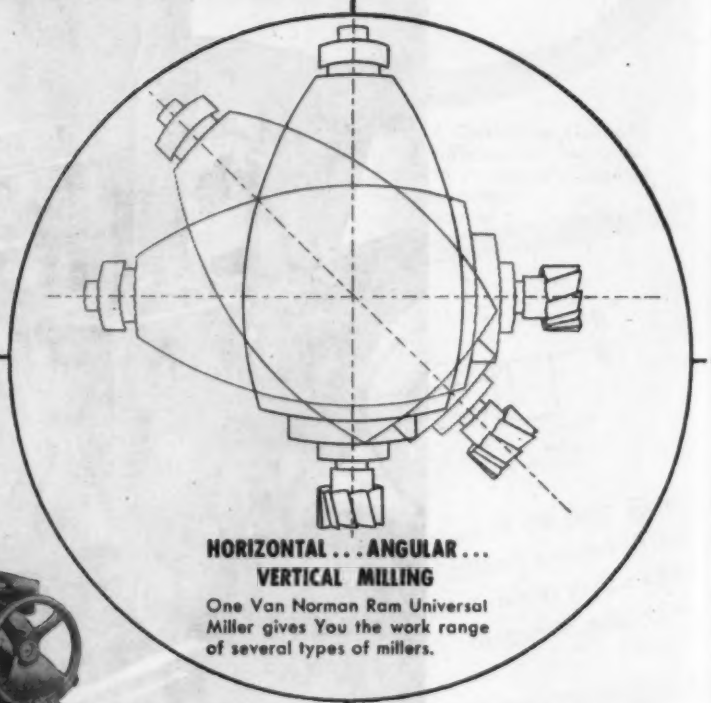
CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Van Norman

Ram Type Universal

Milling Machines





HORIZONTAL . . . ANGULAR . . . VERTICAL MILLING

One Van Norman Ram Universal Miller gives You the work range of several types of millers.

SPECIFICATIONS:

No. 26 Ram Type Universal Miller
Table: 30" x 12"
Range: 28" longitudinal, 12" across, 18" vertical
18 Speeds: 30 to 1500 r.p.m.
18 Feeds: ⅜" to 32"

Vertical Milling—In the illustration at right, the operator is vertical milling a recess in the workpiece.

Angular Milling—Here, the operator is milling a "V" in the workpiece. Note that the set-up of the work is in the original position.

Horizontal Milling—The operator is completing the job with a face milling operation. One work set-up and simple changes of the versatile cutterhead and sliding ram enables the operator to carry most jobs through to completion on a Van Norman Ram Type Universal Miller.

Van Norman Ram Type Universal Milling Machines materially reduce time-wasting reset-ups and cut idle time by as much as 50%.

Here's how.—By simply changing the position of the adjustable cutterhead from horizontal to angular or vertical position . . . you can perform most milling operations on a particular workpiece without a single change of the original set-up. Not only does the adjustable cutterhead enable the operator to complete a job in a shorter time, but because the workpiece stays "put", errors that often accompany work reset-ups are eliminated.

In addition, such Van Norman advantages as directional front and rear controls of all power feeds, large, easy-to-read dials, the extreme ruggedness of the column, ram, saddle and knee assemblies . . . all assure accuracy, economy and maximum production.

THE VAN NORMAN COMPANY, SPRINGFIELD 7, MASS.

"It pays to Van Normanize"

LANDIS Leads in Accuracy

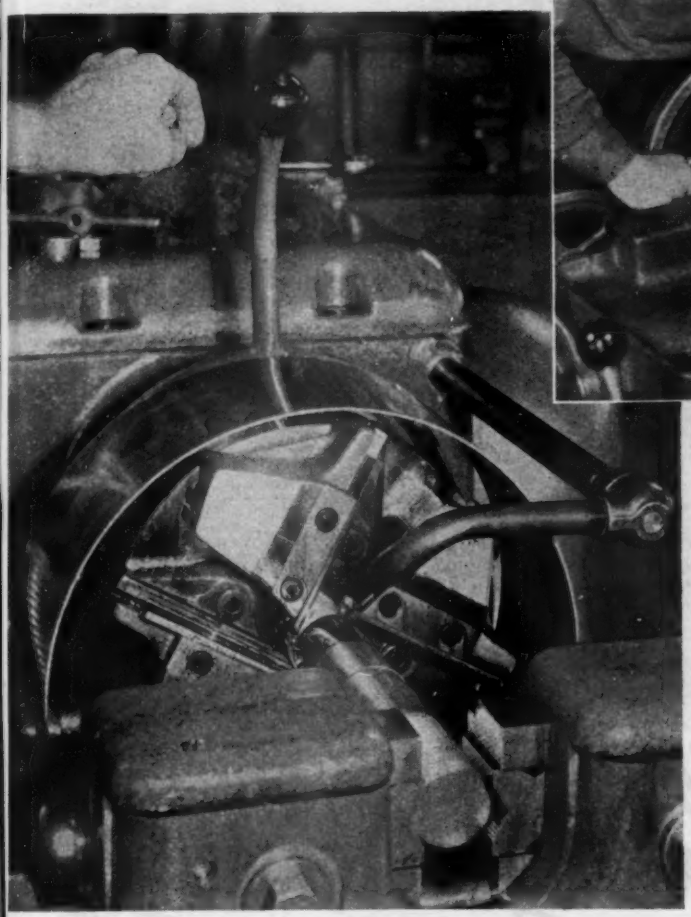
THE LANDIS CHASER

Write for Bulletin

"Be Threadwise—LANDISize"

LANDIS

Quality Performance



Landis Long-Life Tangential Chasers produce 28 linear feet of threads per hour for a manufacturer of alloy steel studs as compared with 12 linear feet under previous method—an increase of over 100%.

An average of 15 bars—more than 5 hours continuous production — are threaded before the chasers require regrinding. Threads are held to class 3 specifications.

For Higher Threading Speed and Longer Runs between Grinds use LANDIS TANGENT TYPE CHASERS.

For Quality, Accuracy and Performance Landis offers you the World's Finest Threading Equipment, tested and proven by actual operation in thousands of plants.

Landmaco Threading Machines, Die Heads and Chasers have been setting new performance records in cutting—with precision accuracy—the countless threads employed in producing materiel of war.

That same quality, accuracy and performance will solve your threading problems in manufacturing the PRODUCTS OF PEACE.

MACHINE CO. WAYNESBORO PENNA. U.S.A.

Trim the Open Ends of Shell Forgings the *Easy* Way—

—and Trim your Costs at the Same Time

The Motch & Merryweather Triple-Chip Method is efficiently trimming shell forgings from 75 mm. up to 16-inch diameter without the difficulties usually encountered in that operation. You, too, can speed up your turning equipment by handing the tricky job of trimming over to an M & M Cold Sawing Machine. May we assist you with your cutting-off problems?

Only M&M builds ALL 3: COLD SAW, SAW BLADE, BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO

It is reported that . . . . . .

A recent survey shows that 89% of the tire and rubber companies and 86% of the paper companies will have new products to offer after the war. 58% of all manufacturers questioned have something entirely new for post-war customers.

get ready with CONE for tomorrow

A new heat-treated glass is in production that resists thermal shock and temperatures to 650° F.

get ready with CONE for tomorrow

One of the large tire manufacturers has just patented a tubeless, uninflated automobile tire.

get ready with CONE for tomorrow

Bimetallic cylinders for internal combustion engines, in which a copper sleeve is bonded to a cast iron cylinder, promise to lessen greatly the problem of heat transfer that has always interfered with high performance.

get ready with CONE for tomorrow

Indium, once worth $20,000 an ounce, now costs $7.50.

get ready with CONE for tomorrow

A plant has just been opened to rebuild completely automobiles by the production line method to new car standards.

get ready with CONE for tomorrow

Aircraft engineers imagine that the big airlines of the future will dispense with landing gear entirely and will be electronically guided into a wheeled cradle at each landing field.

get ready with CONE for tomorrow

The same type of mechanism now used to stabilize the guns of moving tanks could be used to provide smoother riding trains.

get ready with CONE for tomorrow

Foam rubber is expected to replace familiar upholstery construction in automobile seats, saving nearly a foot in the length of the body.

get ready with CONE for tomorrow

One big national picture magazine plans to print entirely in full color after the war.

Factory roofs actually supported solely by air blast from ventilating fans are in use and are the subject of serious experiment.

get ready with CONE for tomorrow

Snap-on molded rubber covers are now being used to mask those parts of electro-plated objects which must remain bare.

get ready with CONE for tomorrow

San Francisco has a plan for a 25 million dollar "World Trade Center" covering twelve blocks of its water front and including a free trade zone.

get ready with CONE for tomorrow

Glass jewels, for instrument bearings, can now be turned out automatically at the rate of 3,500 per day. They are preferable in some respects to natural sapphires.

Through careful research and improvement, one familiar office machine has had 94 per cent of its noise eliminated or absorbed.

get ready with CONE for tomorrow

Electrically conductive rubber is being used to heat aircraft guns and propellers.

get ready with CONE for tomorrow

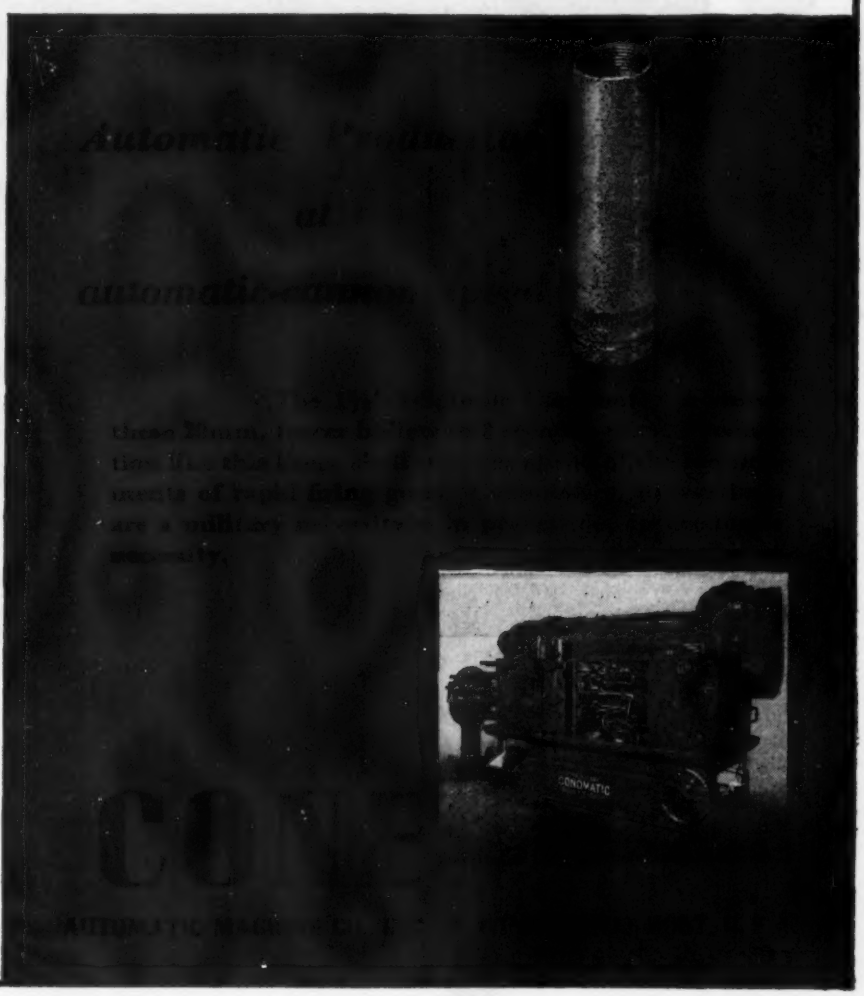
By the use of a resin extracted from Southern pine, foundries have been able to reclaim old sand and reduce their consumption of new sand as much as 75 per cent.

get ready with CONE for tomorrow

A new filtering material, made of pure rubber latex, has as many as 6,400 holes to the square inch.

get ready with CONE for tomorrow

A new adhesive bonds wood to metal, making possible a new product consisting of a 1/48" ply of wood combined with a thin layer of sheet steel. This material can be readily cut and bent, and is decorative, durable, and fireproof.



UNUSUAL VERSATILITY

Landis 4" Type H Plain Hydraulic Grinder

TRAVERSE GRINDING

Automatic wheel feed

Hydraulic straight infeed

STRAIGHT INFEED GRINDING

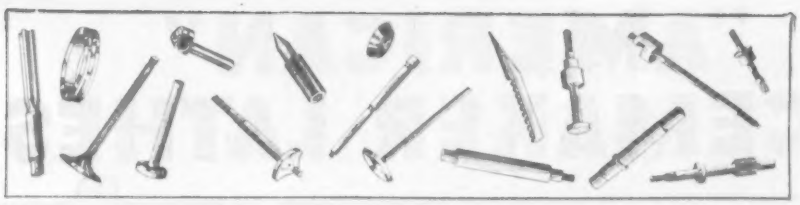
Hydraulic straight infeed

Hydraulic infeed and timer

LANDIS TOOL *Precision Grinders*

LANDIS TOOL CO. • •

for Grinding Small Parts



The word "versatile," as applied to a grinding machine, does not always have the same meaning. The type of machine involved determines the true nature of the versatility in every instance.

When using this term in connection with the Landis 4" Type H Plain Hydraulic Grinders, two things must be remembered. First, the Type H is basically a plain grinder. Second, it was designed primarily for the rapid production of those smaller than average parts.

With this in mind, it quickly becomes evident that the Type H is unusually versatile for a machine of its kind. This is true largely because of the four grinding cycles which are available.

The amount and nature of the optional equipment which may be had, broadens the versatility of the Type H. Landis Tool has long been engineering such equipment for other sizes of plain grinders and has used this accumulated experience to the fullest extent. For full details, write for Catalog A 44.

"Better Grinding" explains the basic principles of precision grinding. Invaluable for both the operator and the man responsible for grinding. Write for your copy today.

- Traverse grinding with automatic wheel feed—possible on the standard machine. Both straight and tapered work may be handled. Table reversal controllable to accurate limits of .001".

- Straight infeed grinding with hydraulic straight infeed—standard machine used. It is practically indispensable where plunge cut grinding has to be done on a high production basis. A reciprocating wheel spindle mechanism is also available which can improve quality of finish.

- Traverse grinding with hydraulic straight infeed—standard machine used. The advantage of employing hydraulic straight infeed when traverse grinding is that it provides rapid withdrawal of the wheel at the end of the cut and rapid approach at the start of the cycle on the next piece.

- Straight infeed grinding with hydraulic straight infeed and hydraulic timer—standard machine required with addition of straight infeed and hydraulic timing device. This is an ideal arrangement where production requirements are exceedingly high, in which case it is often possible for one man to operate two machines! 7

LANDIS TOOL Company

WAYNESBORO, PA.

Guns by the Thousands!!

and Row upon Row of "AMERICAN" PACEMAKER LATHES

...producing them in the Plant of THE DOMINION ENGINEERING CO.

Our fighting forces need guns and more guns and they are getting them in ever increasing numbers.

In the gun plants of this country and Canada "AMERICAN" Lathes are meeting every challenge of increased schedules. They are producing as they never produced before and at the same time are maintaining amazing standards of accuracy.

For all-out production, call on "AMERICAN".

THE AMERICAN TOOL WORKS COMPANY

Lathes - Radials - Shapers

CINCINNATI, OHIO, U. S. A.

A CYLINDRICAL GRINDER WITH ITS WHEEL ROTATING IN THE *horizontal* PLANE

Designed to grind long, limber, out-of-balance work subject to deflection. This Norton development features automatic controls. Working now in secret aircraft production, these grinders will be available postwar without restriction.

NORTON COMPANY

WORCESTER 6, MASS

M-489

NORTON GRINDERS

PRESS One Button FOR CO

This START CYCLE switch is the only one the operator need use to start each automatic cycle on the Monarch Magnamatic Lathe. On the panel are centered all other electrical controls for set-up and automatic operation. These controls give the Magnamatic the flexibility to make it the most universal automatic lathe ever built.

For many varieties of turning, boring or facing work, Magnamatics have proved amazing time savers. Average set-up time for automatic lathe jobs is from 5 to 15 minutes. This permits a Magnamatic to be used economically on short runs . . . yet on the other hand, its completely automatic operation makes it invaluable for machining parts in large quantities.

Any number of diameters or lengths with intervening tapers or contours are produced automatically and precisely on the Magnamatic. A reasonable number of tools can be held in the rear carriage slide for facing, necking or chamfering work. Single point tools are guided by gage blocks, micrometer heads or solid template, depending upon the work.

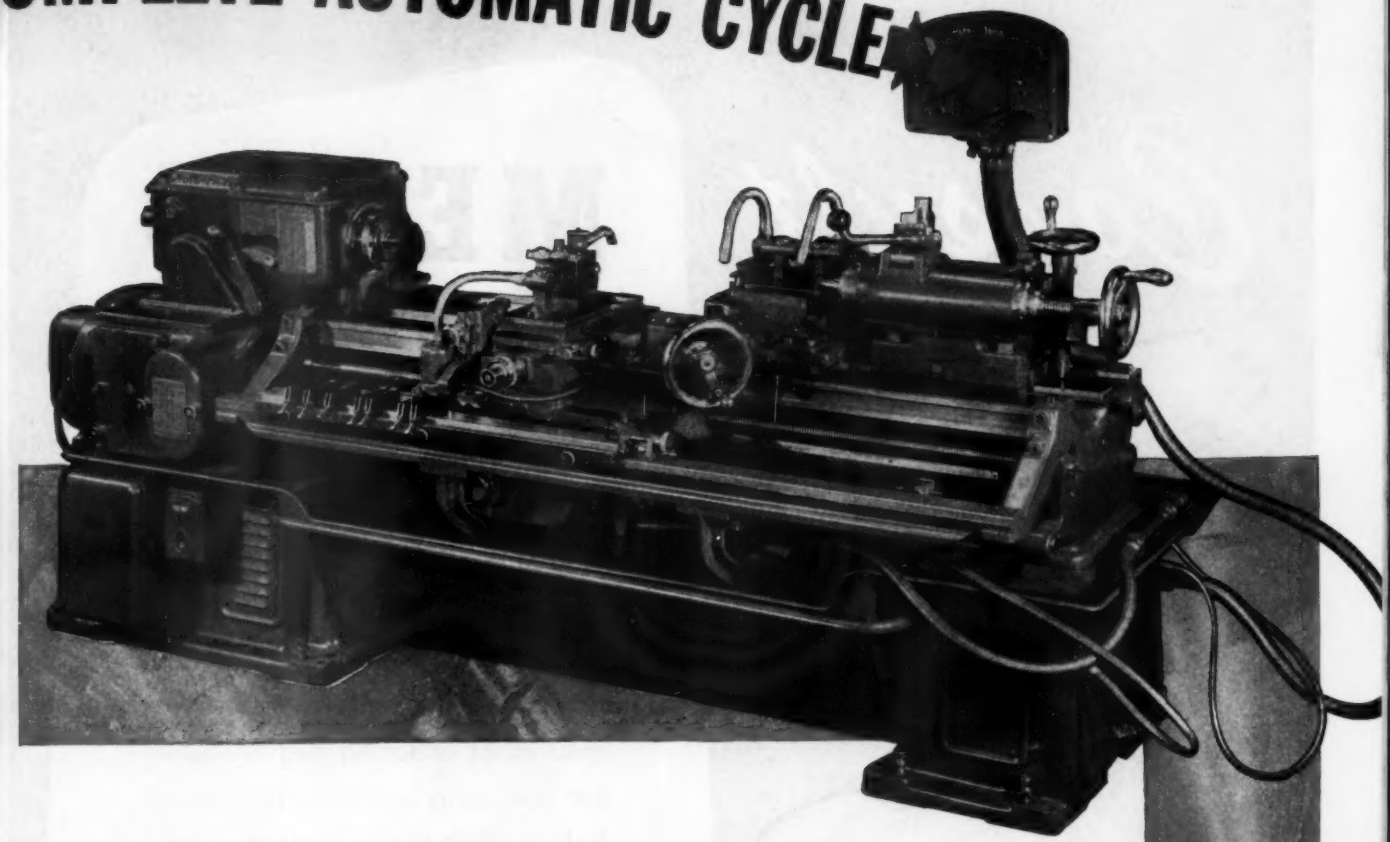
Our engineers will gladly work with you to help you save time and reduce costs with Monarch Magnamatics.

THE MONARCH MACHINE TOOL COMPANY · SIDNEY, OHIO

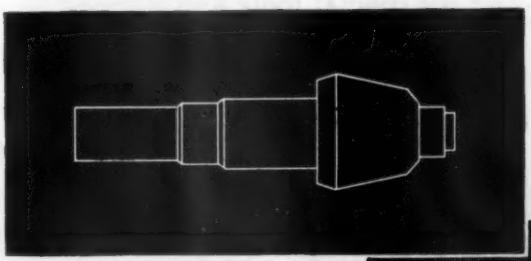
Direct factory branches: 622 West Washington Blvd., Chicago · 10455 Carnegie Ave., Cleveland
801 Fisher Bldg., Detroit · 1060 Broad St., Newark · Liberty Ave. and Stanwix St., Pittsburgh.
Representatives in principal cities.

MONARCH LATHES

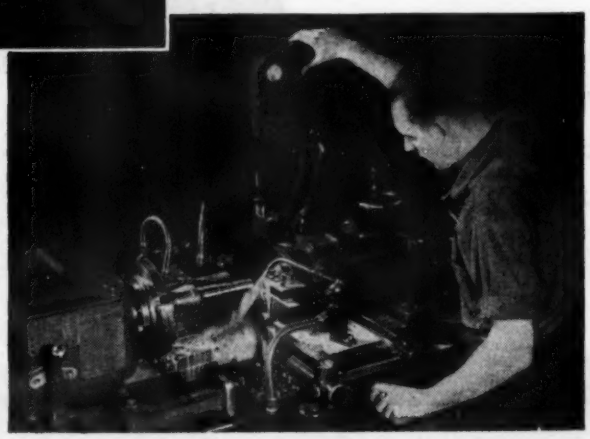
COMPLETE AUTOMATIC CYCLE



Example of typical Magnamatic job



This Monarch Magnamatic is turning a truck bevel-pinion (10¼" long) from a template, with diameters and tapers as indicated. Set-up time with template and rear tools is only 15 minutes. One operator tends two machines, producing 32 pieces per hour. Material is SAE-3150; surface speed, 275′; feed, .017".



Monarch Magnamatics were developed and proved in many plants before the war. Production was interrupted to enable us to deliver standard and toolmaker's lathes for War work. Now, we return Magnamatics to the Monarch line, with reasonably short deliveries. They can be converted to peacetime work quickly without loss of productive time, and with a minimum of tooling cost.

Consult METRO

Cylinder Plug Gages

Special Gages

About Your Tool and Gage Requirements

Metro's long experience, sound engineering practice and skilled craftsmanship insure that *your* Metro Gages and Tools, whether stock items or designed and made up for special jobs, will fully meet your most exacting requirements for precision and accuracy—and help you meet and beat your production schedules. For information on special tools and gauges, when you need them, *ask Metro.*

Metro Standard Gages and Carbide Tipped Tools are available for immediate delivery through your Metro distributor.

Carbide Tools

Write for Free Catalog Today

METRO

TOOL AND GAGE CO.

4240 Peterson Avenue

Chicago 30, Illinois

We're on our way...

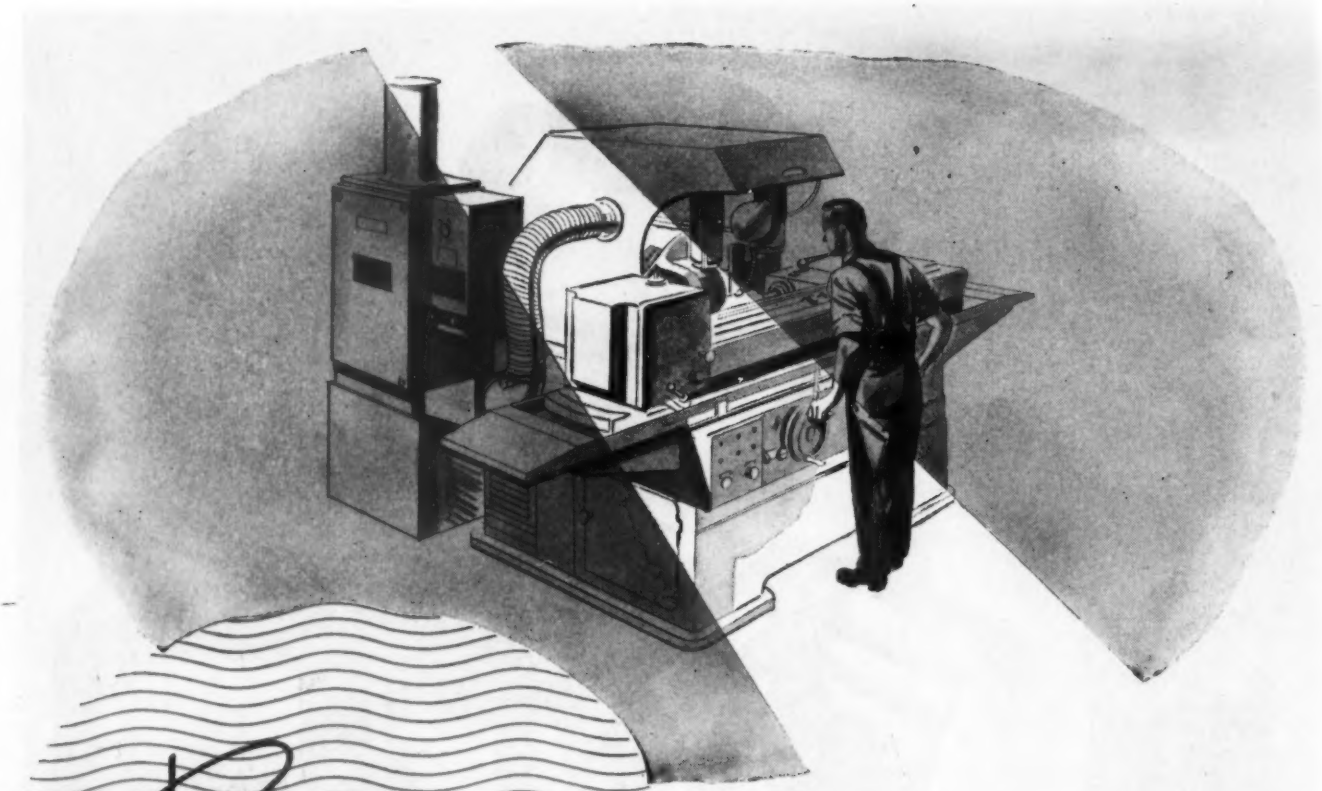
We are doing our part with master production in Diesel, steam and other engines of war and peace.

BUT KEEP THAT GUARD UP!

GENERAL MACHINERY CORPORATION

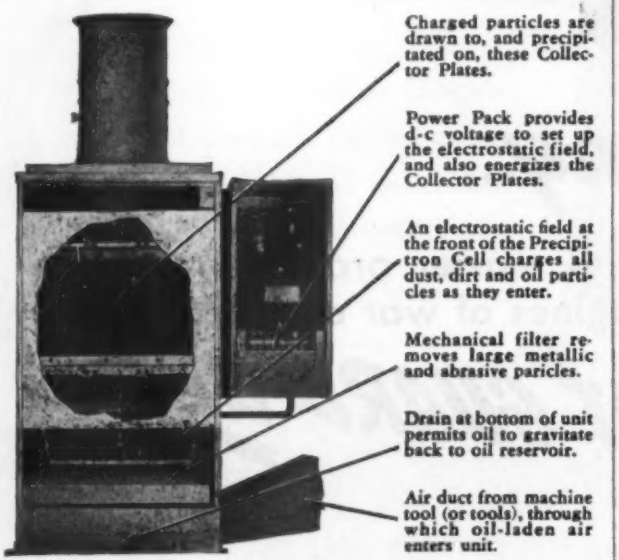
HAMILTON, OHIO

THE NILES TOOL WORKS CO. • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION



Precipitron "INHALES" OIL MIST TO END FIRE HAZARD . . . SALVAGE COOLANT

A NEW PRINCIPLE FOR CLEANING AIR


Charged particles are drawn to, and precipitated on, these Collector Plates.
Power Pack provides d-c voltage to set up the electrostatic field, and also energizes the Collector Plates.
An electrostatic field at the front of the Precipitron Cell charges all dust, dirt and oil particles as they enter.
Mechanical filter removes large metallic and abrasive particles.
Drain at bottom of unit permits oil to gravitate back to oil reservoir.
Air duct from machine tool (or tools), through which oil-laden air enters unit.

Oil mist caused by high-speed machine tools has created a dangerous hazard in many plants. The oil mist collects on lighting fixtures, bus duct, wiring and floors, creating a serious fire and personnel safety hazard.

Precipitron* — the Westinghouse Electronic Air Cleaner—ends this threat. The oil mist is captured right at the machine . . . the air thoroughly cleaned for recirculation . . . the cutting oil salvaged for re-use. And the salvage possibilities can be surprising.

Because it cleans air electronically, Precipitron is able to trap air-borne particles as small as 1/250,000 of an inch in diameter . . . it removes 90% more dirt particles from the air than mechanical air cleaners.

Precipitron is available for either single or multiple tool installations. Operating cost is low and maintenance simple. Westinghouse engineers will be glad to show you how Precipitron will end oil mist hazards in your plant. For more information or engineering assistance write Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa. J-04008

*Trade-mark registered in U. S. A.

Westinghouse Precipitron *the Electronic Air Cleaner*

PLANTS IN 25 CITIES OFFICES EVERYWHERE

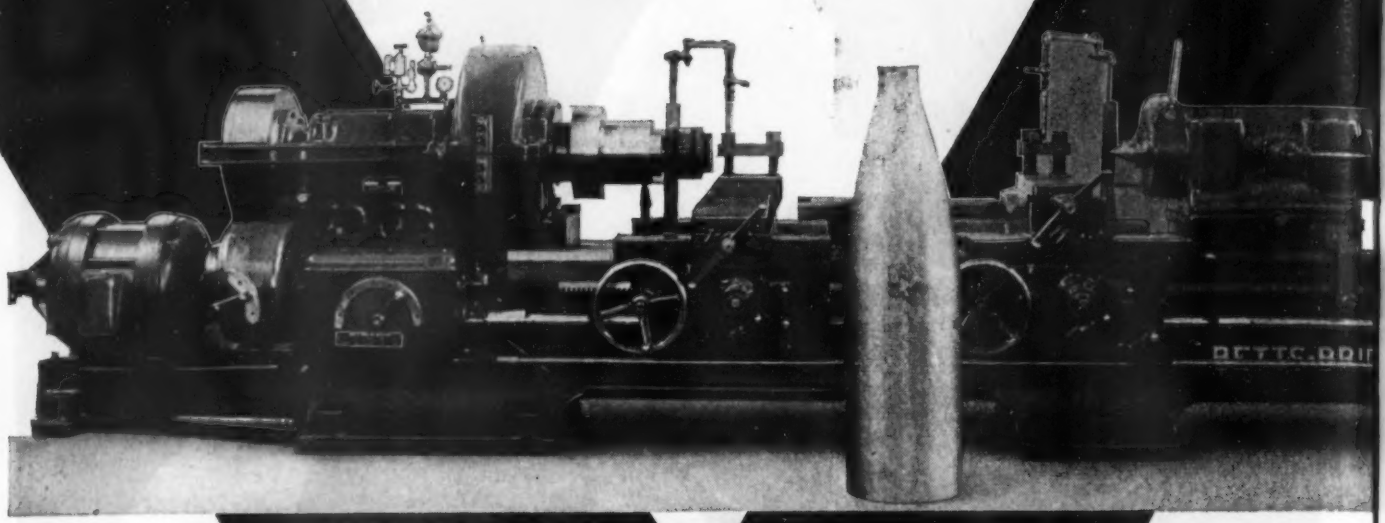
HARDINGE
HIGH SPEED PRECISION MILLING MACHINES

CORRECT SIZE. Closer proportion in the size of a machine tool to the size of the work means greater economy in the original investment and in the cost of the parts produced.

These HARDINGE Precision Milling Machines are small, compact machines designed to do a volume job on small parts, thus releasing large equipment that is too cumbersome for small work in production, tool room or development departments.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

TODAY.... and postwar



BETTS-BRIDGEFORD
HEAVY-DUTY
ROUGHING LATHE

**DEDICATED TO THE CAUSE OF VICTORY
TODAY, CONSOLIDATED MACHINES
WILL SOON BE AVAILABLE FOR YOUR
PEACE-TIME REQUIREMENTS**

This lathe, designed for turning 16 inch shells, is equally serviceable for machining all heavy castings and forgings within its capacity. A dependable heavy duty machine for those exacting jobs where staying power and performance really count.

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

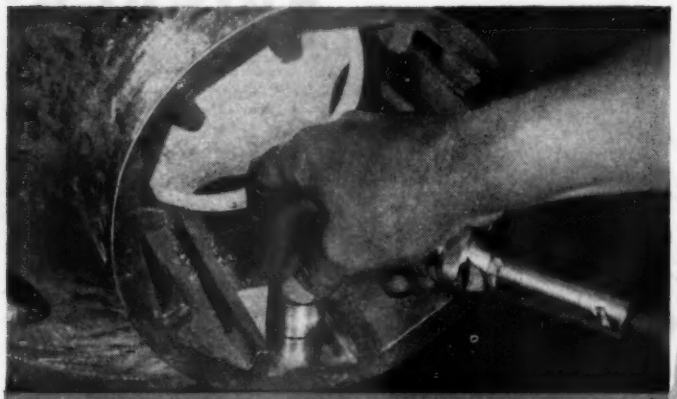
CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

FOR A TICKLISH FINISHING PROBLEM

Call on Kellerflex

Read of this typical case where Pratt & Whitney's Kellerflex flexible shaft equipment "took over" a job that was impossible to do with ordinary machining methods . . . cut operation time by 60%—70% over the hand method!



1 The slots in this bronze casting are designed to contain blocks of lignum vitae driven in and finished to form an underwater bearing. Obviously the rough slots have to be smoothed down so the wood blocks will seat properly. *But* these slots are inaccessible for ordinary machining methods.

2 No problem for Kellerflex. With the right-angle hand-piece and the special bur illustrated here, what *could* have been a tedious, difficult job of hand scraping and filing turned out to be simple as A-B-C!

3 From very little up to as much as 3/16" of metal had to be removed in cases where humps existed on the casting. After the Kellerflex did its work, only a small amount of hand scraping was required for leveling up. And time for the job was cut 60%—70%.

Kellerflex JB-1 with right angle hand piece.

Versatile, dependable, and time-saving, the Pratt & Whitney Kellerflex can take on an infinite number of finishing jobs . . . do them better and do them faster. It is precision-built to the high Pratt & Whitney standards of accuracy—your guarantee of a machine that will stand up and do the job *right*. For full details of various machines and the wide variety of additional equipment and accessories, address our nearest branch office . . . or contact our headquarters. Pratt & Whitney, *Division* Niles-Bement-Pond Company, West Hartford 1, Connecticut. . . . Kellerflex Sales Department.

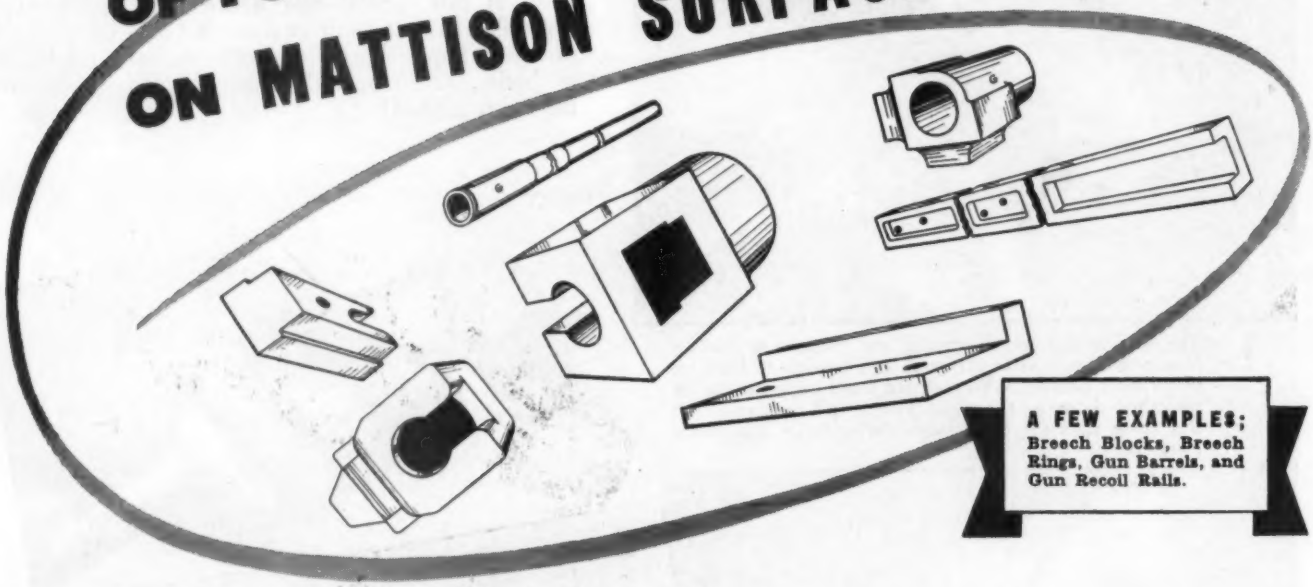
PRATT & WHITNEY

Division Niles-Bement-Pond Company

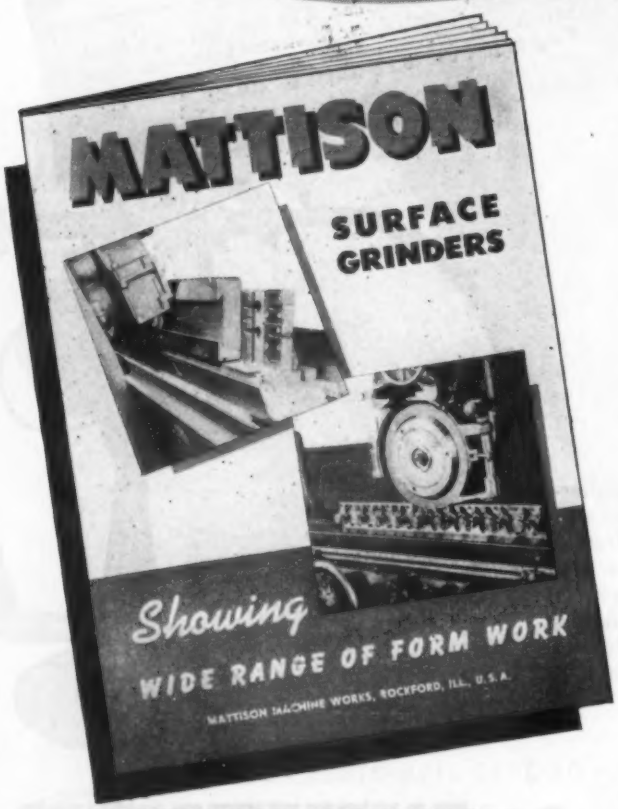
WEST HARTFORD 1, CONNECTICUT

WIDE RANGE

OF FORM WORK NOW BEING GROUND ON MATTISON SURFACE GRINDERS



A FEW EXAMPLES;
Breech Blocks, Breech Rings, Gun Barrels, and Gun Recoil Rails.



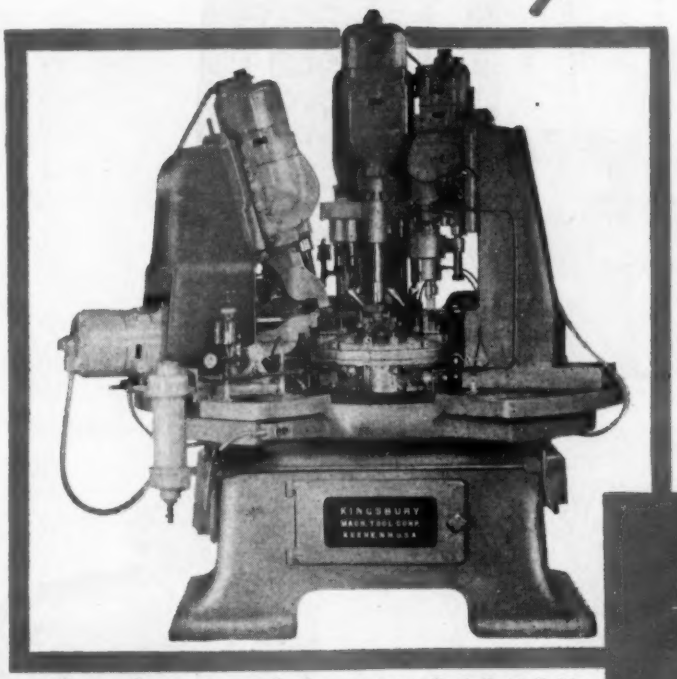
Through the use of special fixtures and contour dressing devices the above parts are all being ground on the Mattison High-Powered Precision Surface Grinder with a great saving of time and to extremely close limits of accuracy. These applications are important, not only from the standpoint of present production needs, but because they illustrate the unlimited capacity of Mattison Grinders over and above regular flat grinding. To you it opens up a new opportunity for grinding, a new opportunity for saving and a new opportunity for increasing production on work previously thought impossible to grind.

Ask for new free book, showing these and other unusual jobs ground by means of special fixtures and dressing devices on the Mattison Grinder.

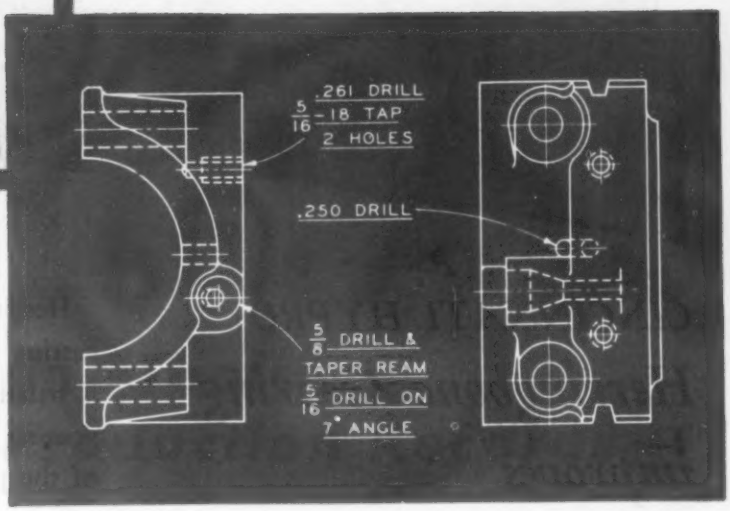
Send for this NEW BOOK

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

FLEXIMATIC
by KINGSBURY



Three operations from three different directions handled in a single chucking of the work . . . . . .

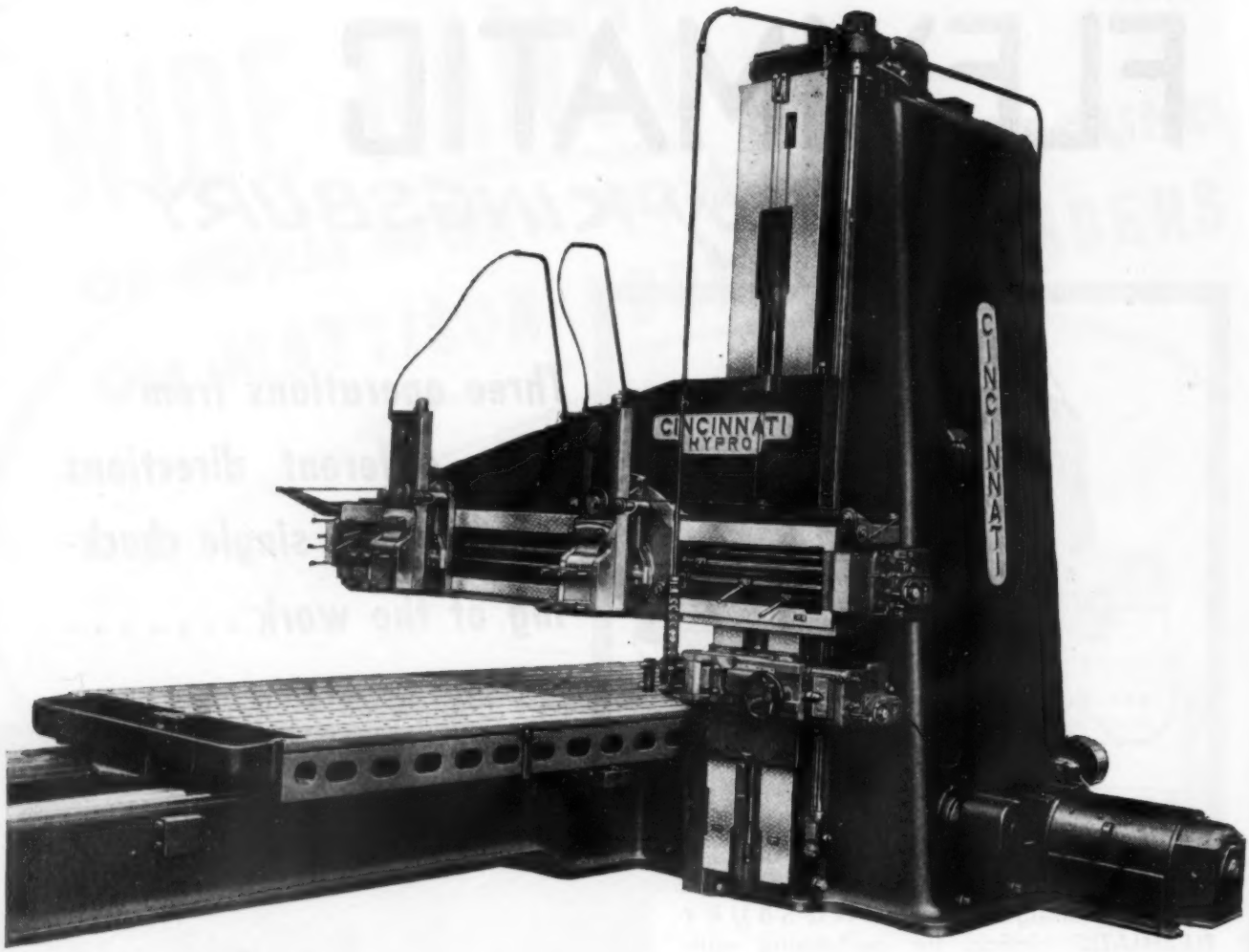


The advantage of the KINGSBURY FLEXIMATIC method for performing various machining operations in a single chucking of the work is exemplified here. The parts involved are automobile rear main bearing caps which are drilled, reamed and tapped on a Model GD FLEXIMATIC from three different directions without rechucking. All operations occur simultaneously during unloading and loading.

Obviously, ability to handle work of this nature in the way it is handled on a FLEXIMATIC means outstanding production capacity. To this advantage must be added the precision which characterizes FLEXIMATIC performance—a combination which is of such outstanding value today because it makes every minute count in high speed precision production. Furthermore, KINGSBURY FLEXIMATICS conserve man power through the ability of one operator to easily out-step the productivity of several men on general purpose machines.

Basically, the FLEXIMATIC is an automatic indexing machine built up of a number of standard specific operation units in such a way that *all* operations can be performed in a single chucking of the work. By the Kingsbury-pioneered FLEXIMATIC method, unique, flexible and versatile machines are available not only for fast, accurate production but also for quick set-up and convenient change-over.

KINGSBURY MACHINE TOOL CORPORATION
KEENE NEW HAMPSHIRE U S A



CINCINNATI HYPRO Herringbone Gearing improves PLANER accuracy

Herringbone gearing provides continuous and smooth cutting on all Cincinnati HYPRO Planers. Axial thrust is balanced and absorbed within the gear member preventing harmful thrust loads and stresses on other parts of the planer. Pressure of the table on the vees is completely equalized.

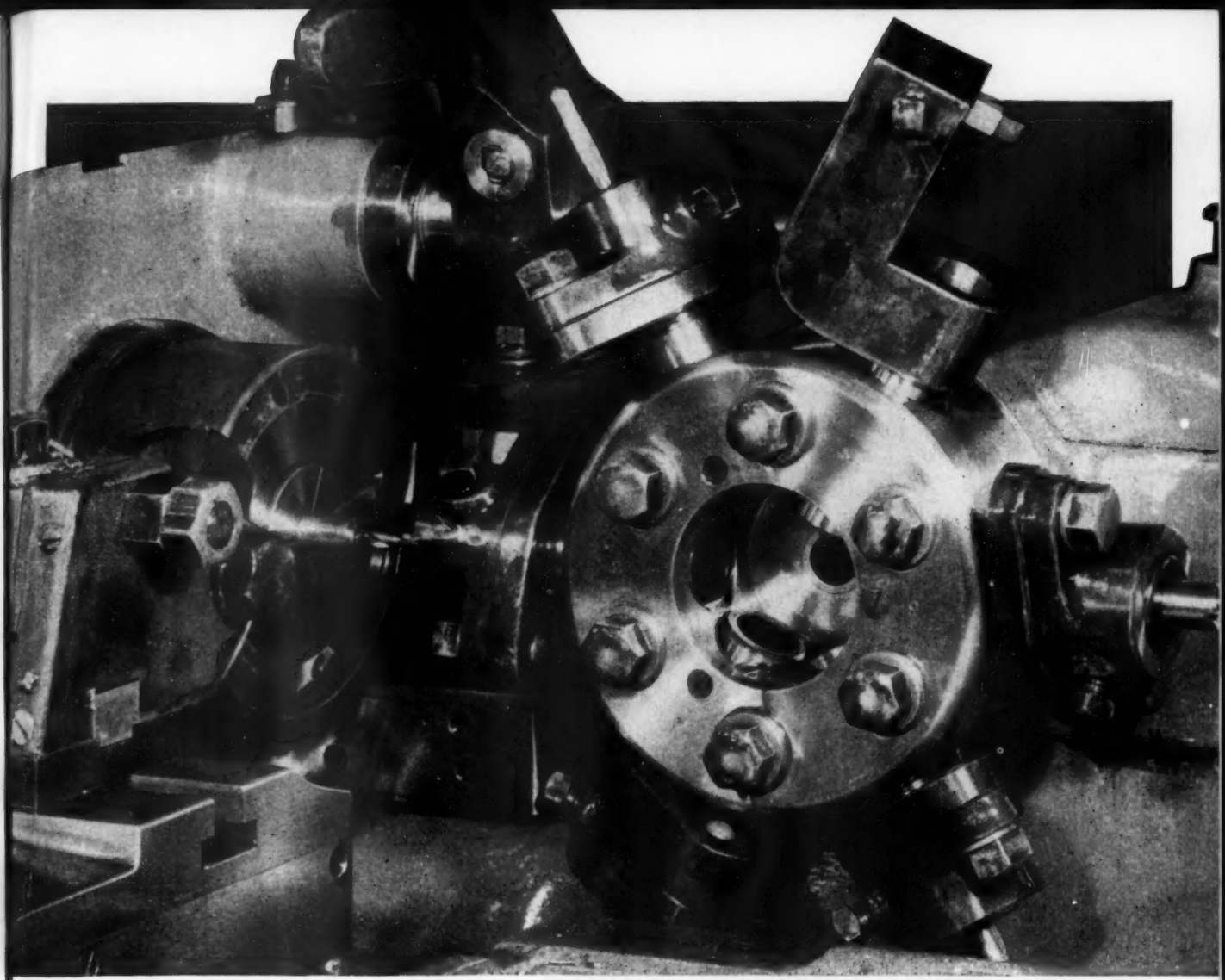
Each herringbone gear tooth comes in contact with the load gradually. They retain their involute profile and correct tooth action throughout their entire life.

Herringbone gears work smoothly and silently—eliminating chatter. When you buy a Cincinnati Hypro Planer you get all the HYPRO-duction advantages of the most modern machine tool.

ARMY E NAVY

Write for Bulletin 110-AM describing and illustrating the Cincinnati Openside Planer line.

THE CINCINNATI PLANER COMPANY
Planers...Vertical Boring Mills...Planer Type Millers
CINCINNATI . OHIO . U.S.A.



Good Screw Machine Tools Help Attain New Production Records—

Brown & Sharpe Screw Machine Tools have the characteristics that give superior performance.

1. **Carefully selected cutting steels.**
2. **Designs that provide rigidity and accurate work.**
3. **Convenience of adjustment.**
4. **Long tool life.**

These productive tools have the same high qualities of design and performance as Brown & Sharpe Screw Machines. They answer the exacting production demands of the day.

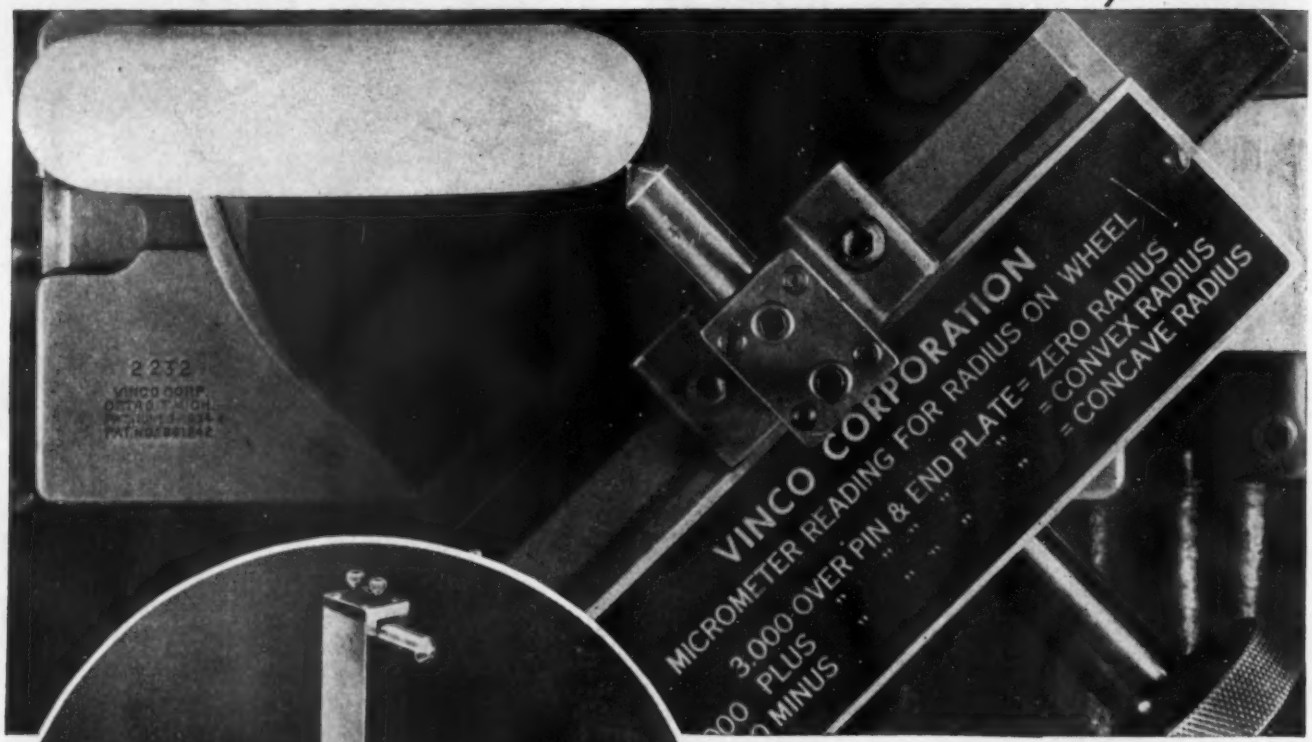
Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

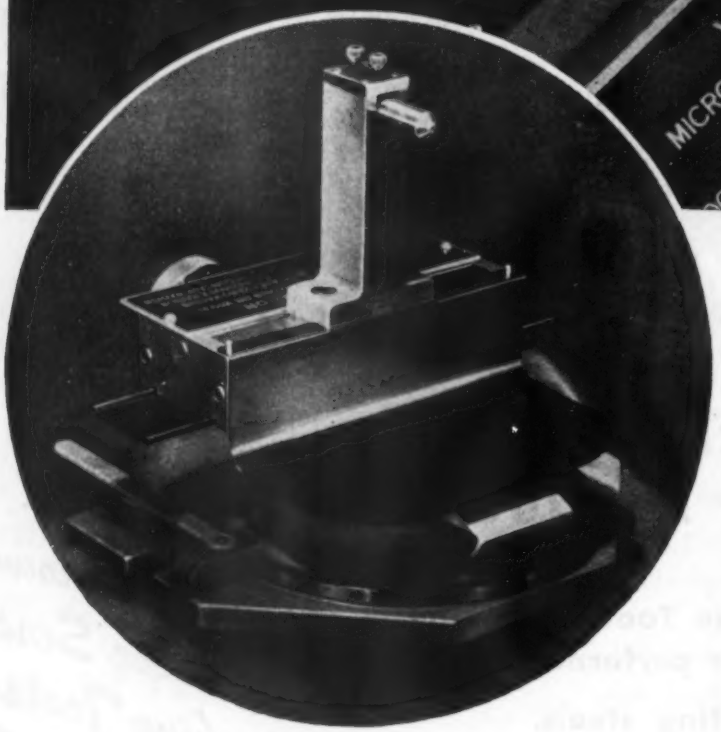
There are Brown & Sharpe Screw Machine Tools for Every Setup. Send for Catalog.

. . . We urge buying through the Distributor

BROWN & SHARPE

THERE ARE OTHER ANGLES, TOO


VINCO CORPORATION
MICROMETER READING FOR RADIUS ON WHEEL
3.000 OVER PIN & END PLATE = ZERO RADIUS
PLUS " " " " = CONVEX RADIUS
MINUS " " " " = CONCAVE RADIUS



Sub bases will be furnished (at slight additional cost) for most types of external and internal grinders. When ordering, specify the machine or machines on which the dresser will be used. This will enable us to advise you correctly on the type of base best suited to your specific needs.

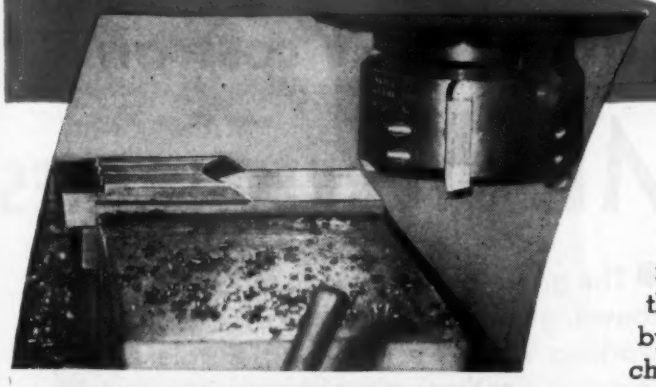
The opinion of men who are using the VINCO Model B-1 (Angle Tangent to Radius) Dresser daily—that is an important angle—the shop superintendent who can see increased production and cleaner grinding—the foreman who can charge minutes instead of hours to wheel dressing when computing labor costs—the cutter grinder who can now dress a wheel to the job instead of re-chucking the job to fit the wheel—these are a few of the personal angles that are largely responsible for the rapid increase in the VINCO B-1 Dresser acceptance. Write us direct or consult our District Sales Offices for any further information.

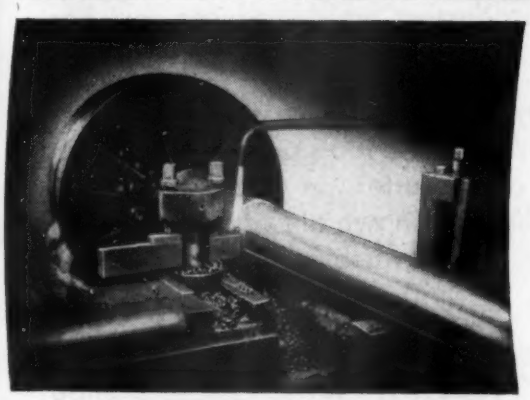
VINCO CORPORATION, 8851 SCHAEFER HIGHWAY, DETROIT 27, MICH.
SALES OFFICES— NEW YORK CLEVELAND CHICAGO

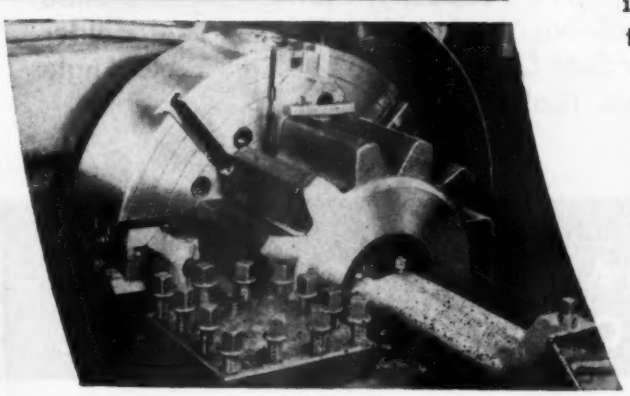
MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

Your Profit IS MADE *at the point of the* CUTTING TOOL







The output of America's gigantic metal-working industry—in war or peace—depends upon the effectiveness of a small edge on cutting tools. When the cutting edge is Kennametal—as demonstrated by scores of service results—the productivity of machines can be more fully utilized.

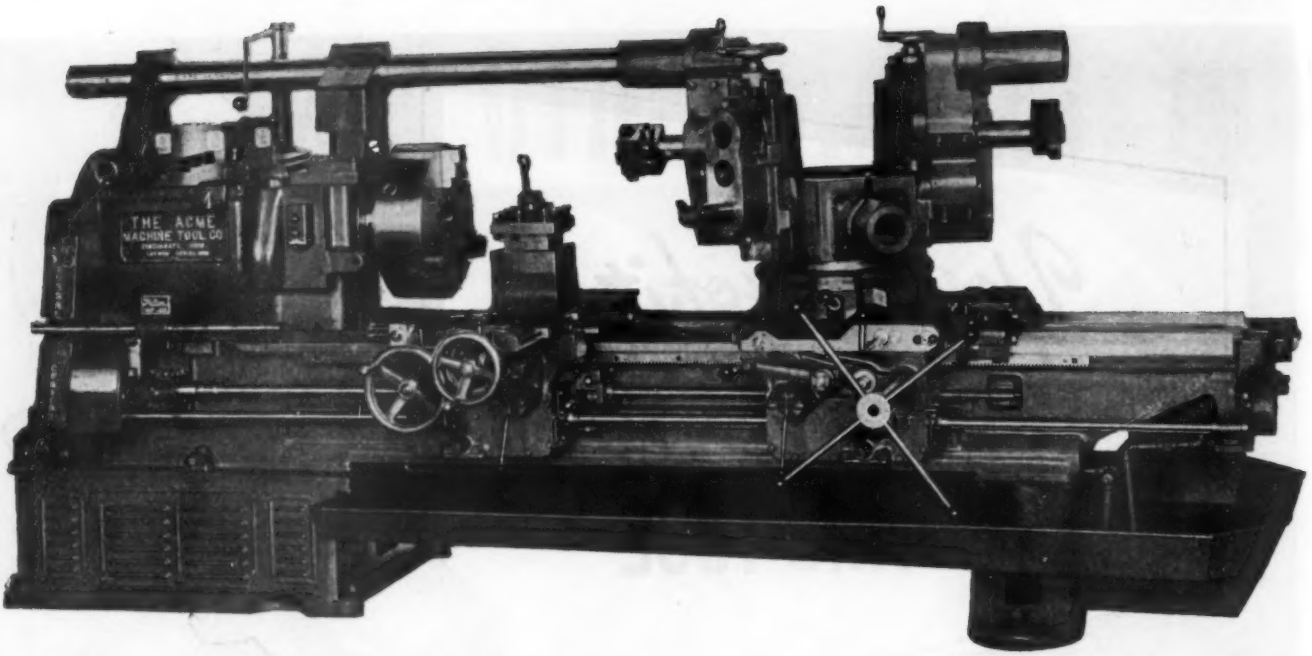
Kennametal-tipped tools—through their unique ability to cut metals, including steels of high Brinell hardness, accurately, at greatly increased speeds, and with amazing tool life—have been of inestimable aid to industry in turning out the tools of war on time. They will be equally indispensable in producing improved products of peace, at lower prices.

Thus, Kennametal—in common with other inventions that have been brought forth under the American system of free enterprise—returns profit, not just to its inventor, nor only to the industries in which it functions, but . . . chiefly to all our people.

KENNAMETAL

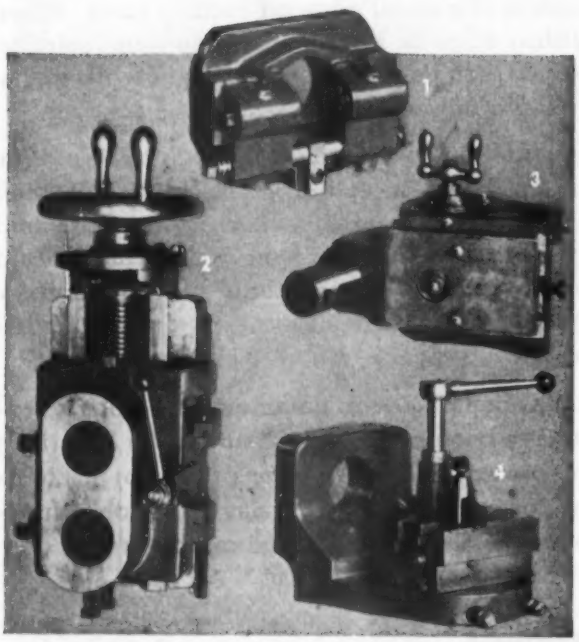
SUPERIOR SINTERED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.



Correct tools do a job faster and better . . . and at a lower cost on

CINCINNATI ACME TURRET LATHES



● The group of heavy duty tools and holders shown give Acme Turret Lathes a greater working range—provide closer tolerances—increase production which reduces cost per piece.

The rigidity and massive construction assures ample support to the tools and freedom from vibration and chatter on heavy cuts. All tools and holders shown are adapted for use on the No. 3S Universal Acme Turret Lathe illustrated.

The group consists of: No. 1—knurling tool with 3½" capacity—No. 2—Vertical Slide Tool—No. 3—Angular Chasing Tool Holder for Side Carriage—No. 4—Adjustable Angle Rack Tool.

...The ACME MACHINE TOOL CO.
...CINCINNATI 32, OHIO.

American's Complete Broaching Service

Solving Production Problems of War

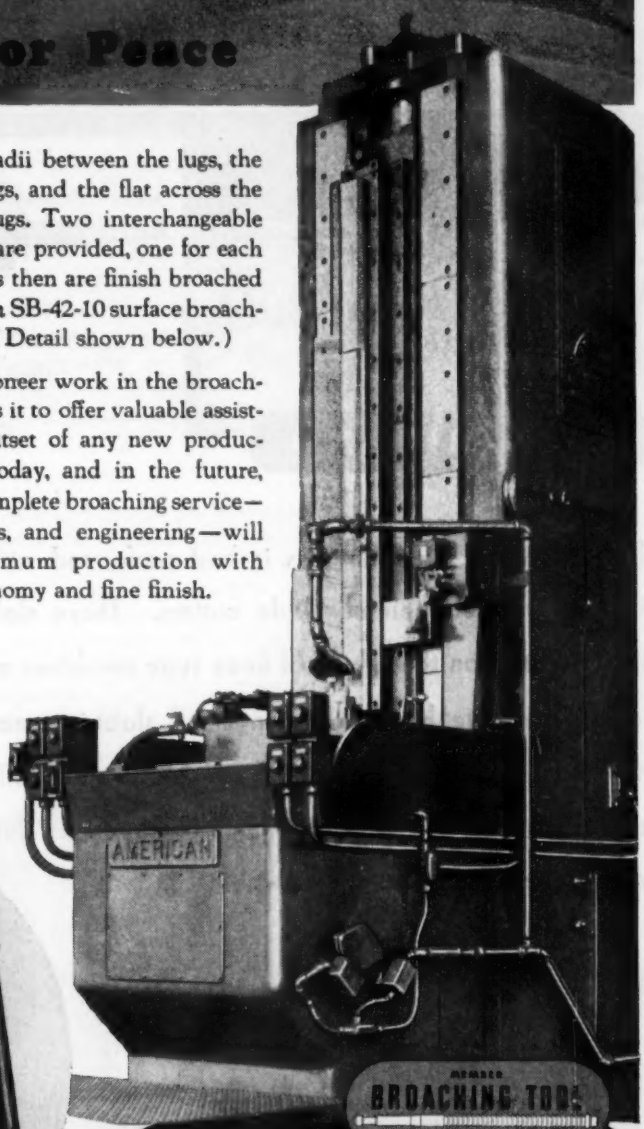
. . . Ready to Plan for Peace

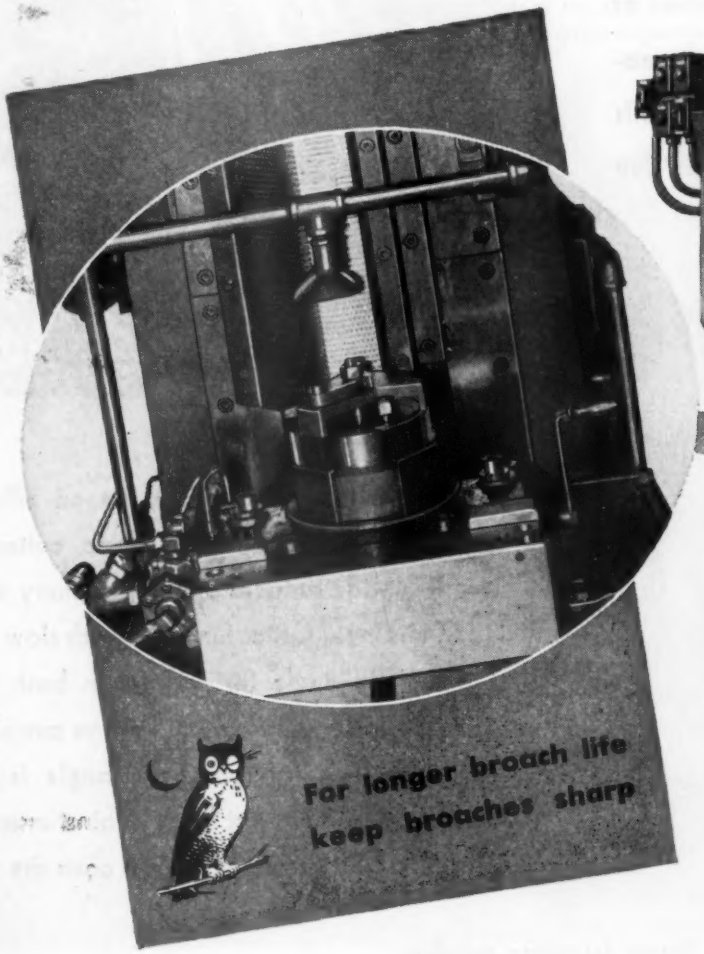
The advantages of broaching by *American* are well known to the Nation's leading manufacturers. Almost every war industry has made use of broaching, the *American* way, to secure fast, accurate, economical output.

For example, American Broach and Machine Company engineers recently designed the broach tooling and setup for the production of a new aircraft part. One operation entails the finishing of the external contour of a two-part stop sleeve.

An *American* SB-66-15 surface broaching machine (shown at the right) rough broaches the radii between the lugs, the sides of the lugs, and the flat across the index of the lugs. Two interchangeable tooling setups are provided, one for each part. The parts then are finish broached on an *American* SB-42-10 surface broaching machine. (Detail shown below.)

American's pioneer work in the broaching field equips it to offer valuable assistance at the outset of any new production effort. Today, and in the future, *American's* complete broaching service—machines, tools, and engineering—will provide maximum production with maximum economy and fine finish.





MEMBER BROACHING TOOLS INSTITUTE

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

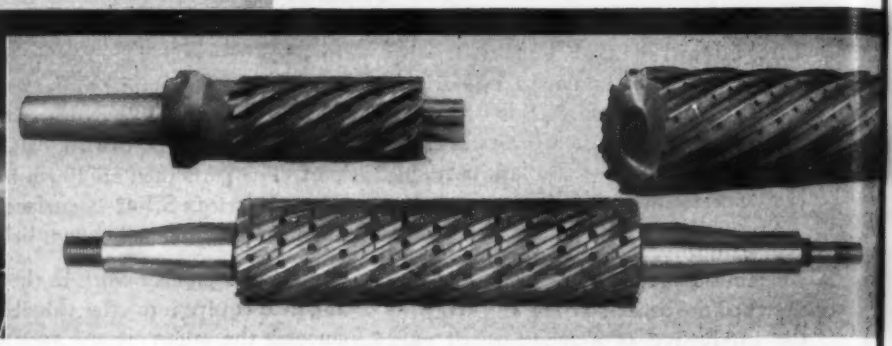
•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

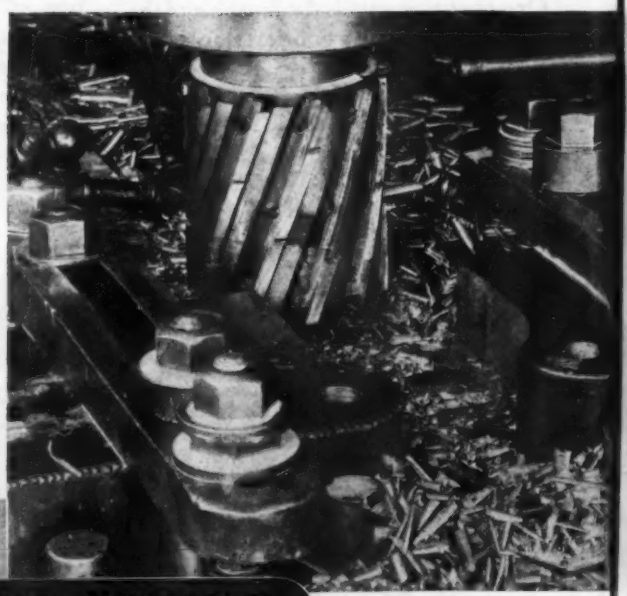
INGERSOLL HELICAL CUTTERS

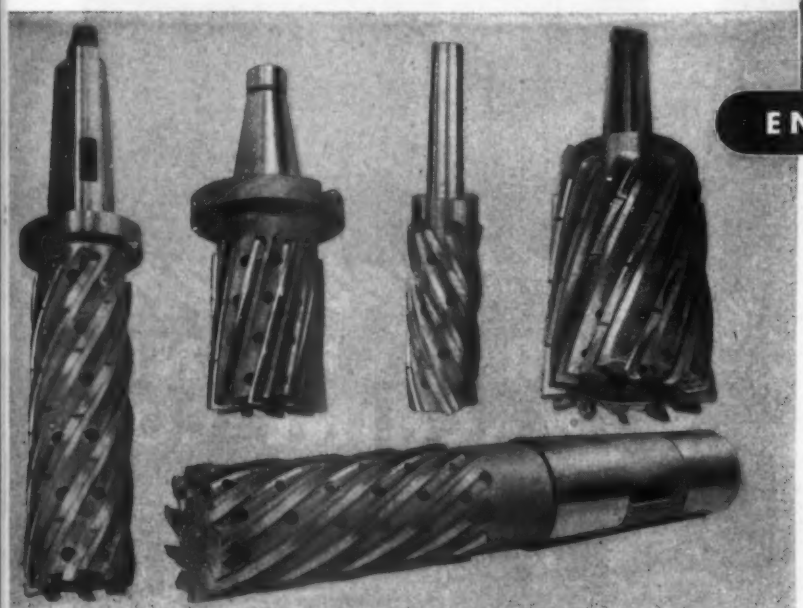
Ingersoll offers the only true inserted blade *helical* cutters. Blades are forged, twisted, hardened, and then ground to a true helix to accurately fit helical milled slots in the body. Cutter blade presents a constant rake angle to work, with steep helical or shearing angle, enabling cutter to mill with minimum of power. Several teeth are always in the cut. This and shearing action of helical teeth gives smooth finish at high feeds.



SLAB MILLING

Slab milling of wide surfaces is best performed with Ingersoll inserted helical blade cutters. These slab mills are used on the arbors of knee type machines as well as on large heavy duty Ingersoll slabbing machines as illustrated. These inserted blade slab mills are replacing many solid high speed steel types due to the economy of using renewable blades.





END MILLING

Ingersoll helical end mills are an efficient and renewable inserted blade cutter for milling wide surfaces on the periphery while end milling. Cutter furnished with slow positive helix angle for cutting on both face and periphery. When milling on periphery only, a high reversed helix angle is preferred to direct thrust back against machine spindle. Replacement blade costs are low.

Send for Engineering Specification Sheets describing complete line of Ingersoll standard inserted blade milling cutters.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOI

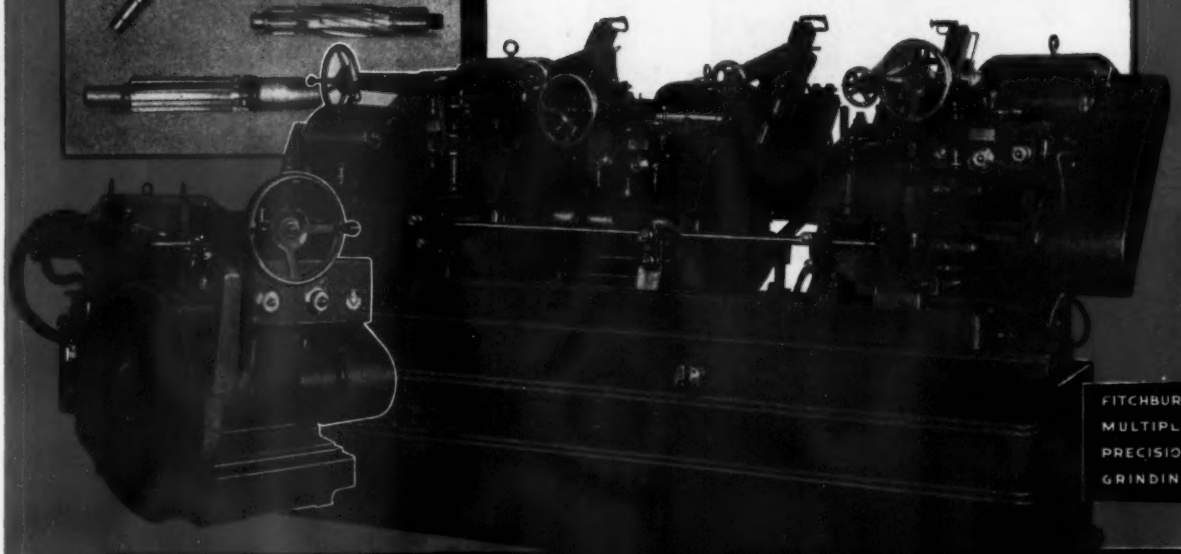
THE FITCHBURG METHOD OFFERS . . . SPECIAL MACHINES FROM STANDARD UNITS

Fitchburg automatic multiple precision grinding offers the same profit possibilities that up-to-date shops now earn with multiple tooling and combined cutting on machined work.

Special machines mounting Standard Bowgage Head Grinding Wheel units, like the one illustrated, enable the precision grinding of two or more dimensions at a single handling. Grinding is completed within the time required for the longest single operation. On mass production work these Fitchburg grinders rapidly repay their cost.

On hundreds of parts like those shown, for machine, automotive or ordinance work, Fitchburg engineers can help you to make sure your orders are filled on time, and at the lowest possible cost. It will not obligate you to mail in your blueprints for study. Catalog shows wide range of other successful applications. Write for a copy today on your business letterhead.

When installing special grinding equipment it is important to remember that the Fitchburg Bowgage Grinding Wheelhead is a self-contained standard unit. It can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.



FITCHBURG MULTIPLE PRECISION GRINDING

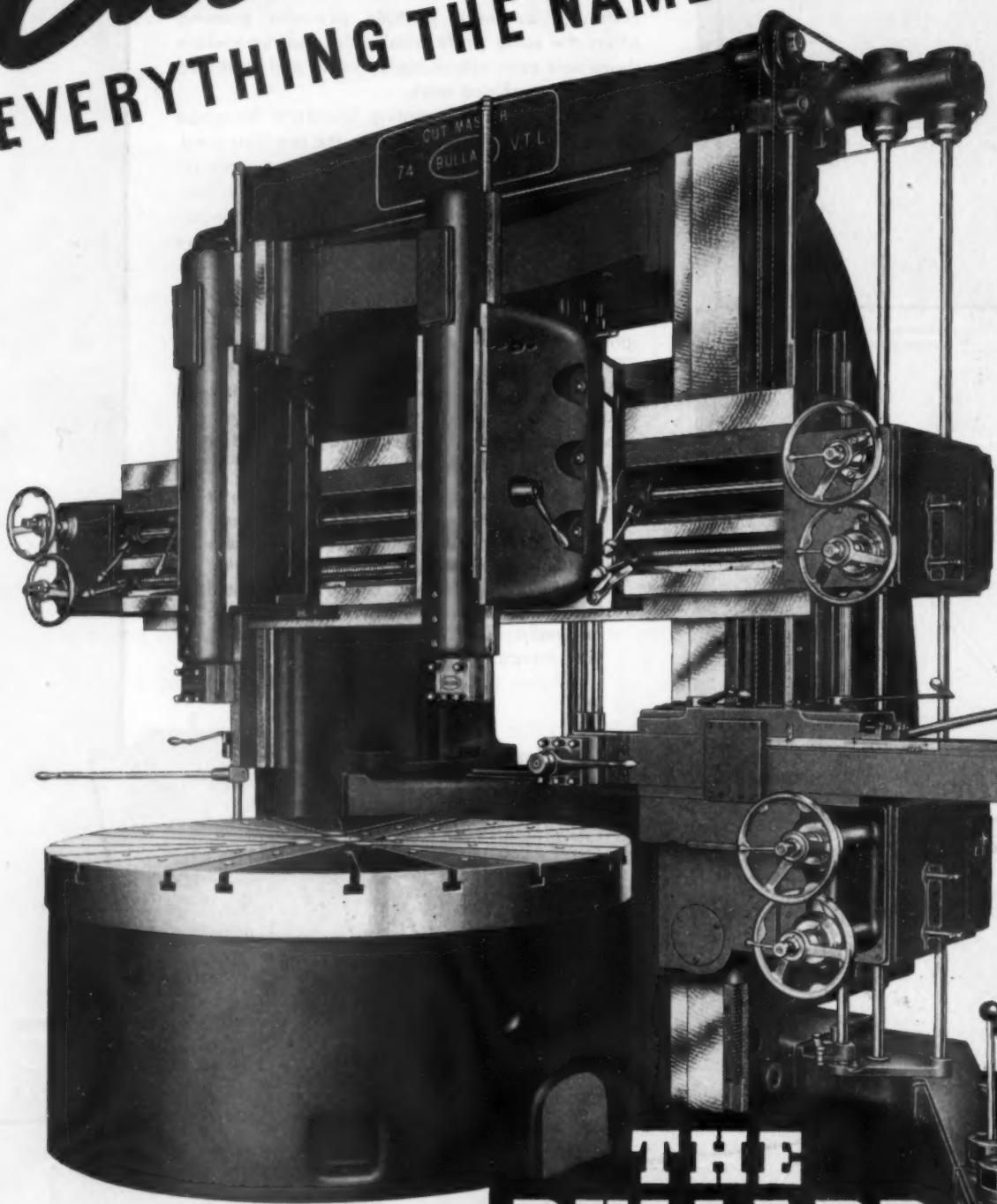
FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders

Cutmaster

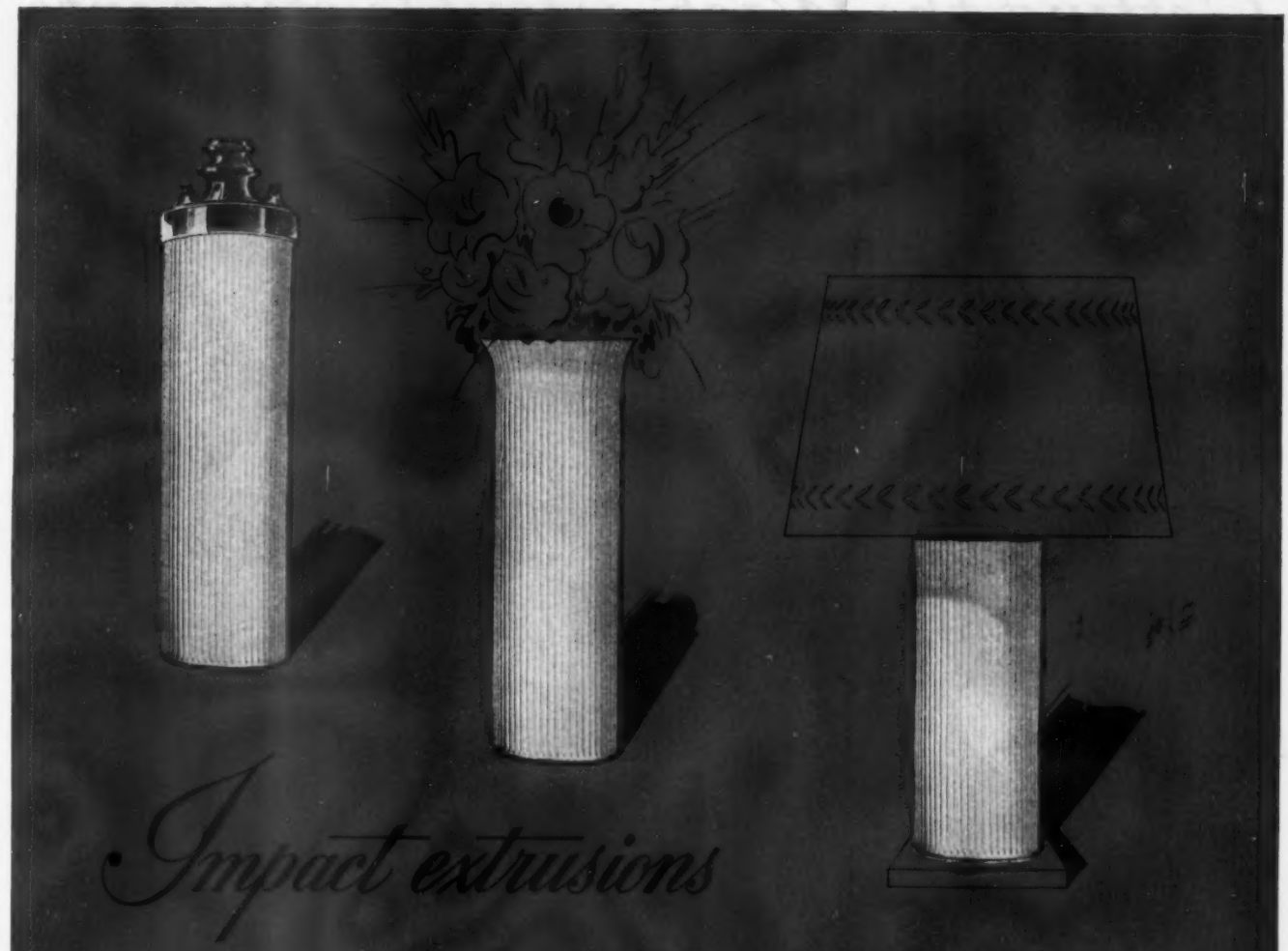
EVERYTHING THE NAME IMPLIES...



This massive 74" Bullard Vertical Turret Lathe has what it takes to take what you give it. It is rigidly constructed with plenty of power to pull through the cuts with all three heads working simultaneously. This fact provides plenty of time saving on any job. The screw feed of the vertical heads assures a high degree of accuracy not found with other types of feeds. There are other facts about this machine which you should know.

Send for circular CTV74—Gen.—3-3-44 TR.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT



uncover your Imagineering instincts

Put a plastic cap on this aluminum impact extrusion, as Alcoa's customer does, and you have the container for an electrical coil. But show it to an "Imagineer" and you hear a dozen different ideas—

Flare its open end to make an unusual, attractive vase—Turn it upside down on a plastic base, wire it for electricity, and you have a beautiful table lamp—Extend those fins even more than here, and you get a superior heat-radiating case for any kind of electrical or mechanical equipment. And so the suggestions go, on and on.

But the method of making this part—the impact extrusion process—is even more intriguing. One wallop of a press on an aluminum blank and it is formed, ribs on the inside or out, bosses in the bottom, if needed. The Alumilite finish (process patented) may be added, increasing corrosion resistance and making the shell most attractive, in plain aluminum or a variety of other colors.

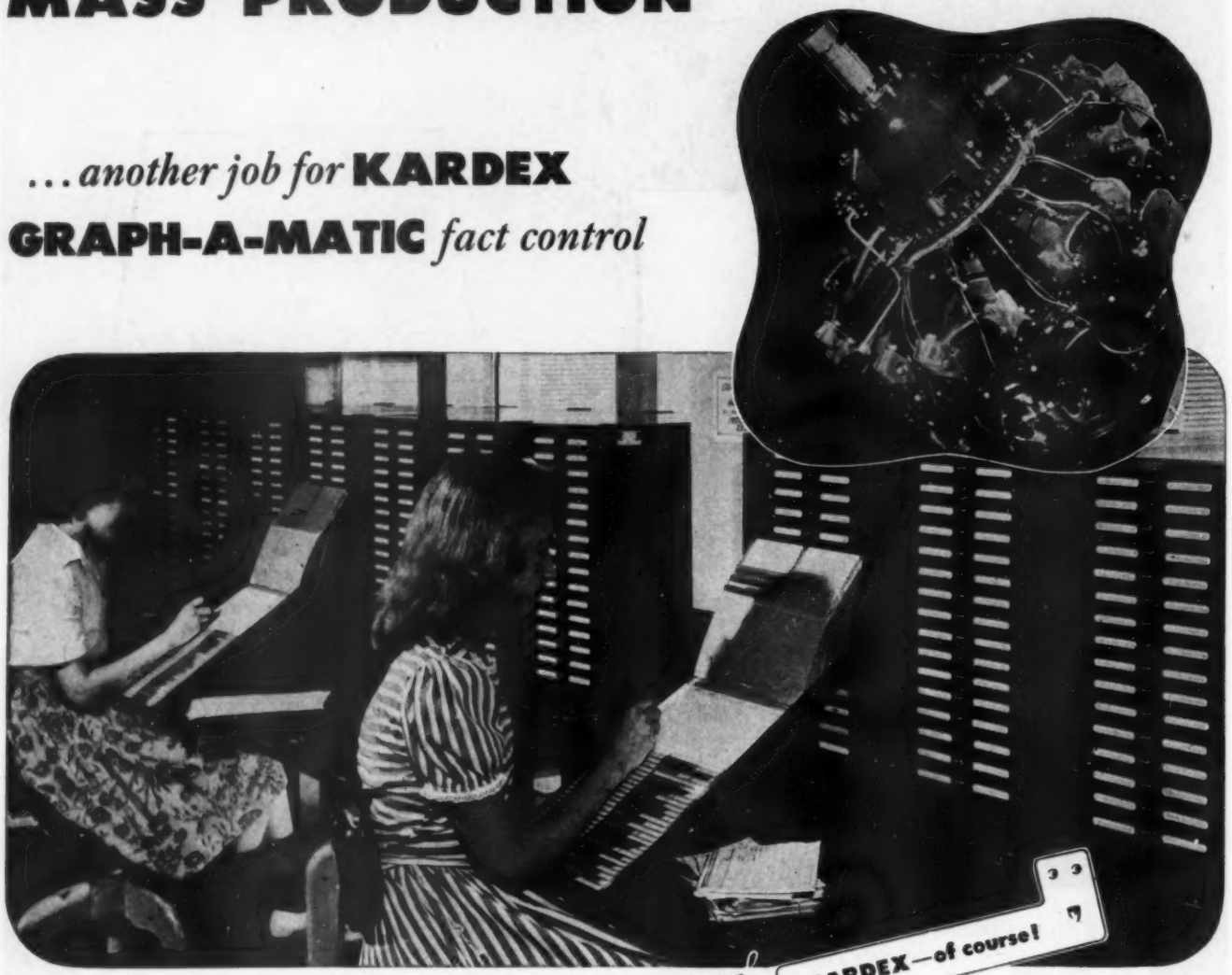
Final costs are often less when you start with Alcoa impact extrusions, because so little work is required to complete them. Winning the war comes first, but aluminum is now being used for other-than-war purposes as the manpower situation permits. Our representative will be glad to discuss the availability of aluminum with you. Write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

Getting the Wasp's double sting into

MASS PRODUCTION

...another job for KARDEX GRAPH-A-MATIC *fact control*



"Fact-Power" is on our side as Pratt & Whitney swings into mass production of the newest super-powerful *Double Wasp* in its Navy-sponsored Kansas City Plant.

The tremendous task of coordinating the work of five thousand machine tools and a labor force fast approaching a planned total of twenty-nine thousand calls for speed and smooth-running efficiency. On it depend great new fleets of *Corsairs, Thunderbolts, Hellcats* and other aircraft destined to out-perform the enemy's best.

For the efficient production and organization of recorded facts, the *millions* of facts required to correlate inventory control and materials flow, personnel, time-study, machine scheduling and various other activities, Pratt & Whitney relies on the "Fact-Power" of Kardex and related Remington Rand Systems of Record Administration. With the exclusive Graph-A-Matic signal control that *charts* the interrelation of facts on the Kardex Visible Margin, this famous engine builder obtains the simple, complete control that current operations demand.

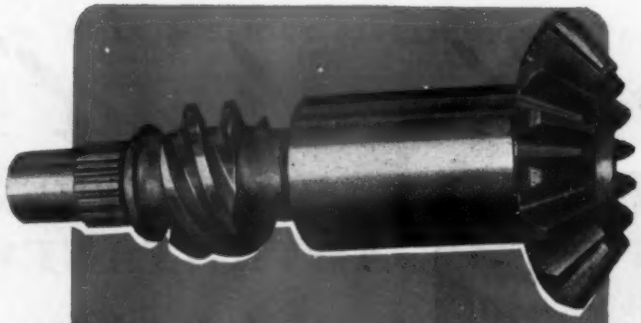
Let a Systems and Methods Technician show you how these systems are conserving time, manpower and money for other companies . . . and can do these things for you.

Write, wire or phone our nearest Branch Office

SYSTEMS DIVISION

REMINGTON RAND

BUFFALO 5, NEW YORK



ANOTHER EXAMPLE OF

BARBER-COLMAN

HOBBING PERFORMANCE

Teeth of worm must be placed in specified relation to teeth of bevel gear.

Pitch line of worm must be concentric with ground surfaces within .001".

Single-position hob needed to avoid interferences of high spiral of worm teeth.

To maintain synchronism, all feeds are locked and reversible motor used.

SUPPORT YOUR *Community* WAR FUND

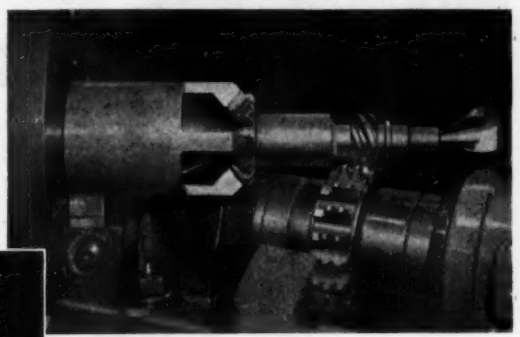
Combination Vertical and horizontal feeds are used on B-C type "A" machine.

AN UNUSUAL JOB...

The problem, in this instance, was to provide a means for production cutting of a 4-thread worm on a shaft in an exactly specified relation to other elements and with a considerable degree of accuracy. It was accomplished by using a single-position hob on a B-C Type "A" Hobbing Machine which was modified slightly to eliminate interferences resulting from the small size of the piece. Combination vertical with horizontal feed is used to cut to full depth after clearing the shoulder. Feeds remain engaged and the hob is returned to starting position by reversing the main drive motor, thus assuring maintenance of synchronism and accurate duplication of the required positioning.

THIS METHOD ESTIMATED 3 TIMES FASTER THAN ANY OTHER KNOWN

While it might seem longer to have to reverse the machine, a study of other possible methods producing this worm showed that the hobbing method described here was by far the fastest and best.



The piece is a tachometer drive gear and shaft gun control for an aircraft engine. It is of PWA 190 steel. The worm has 4 teeth, 12 pitch, 14½° P.A., set at a spiral angle of 67° 11". It has a face of ½". The hobbing set-up uses a feed of .010" per rev. of work and a hob speed of 139 r.p.m. Cutting time is 2.86 min. per piece.

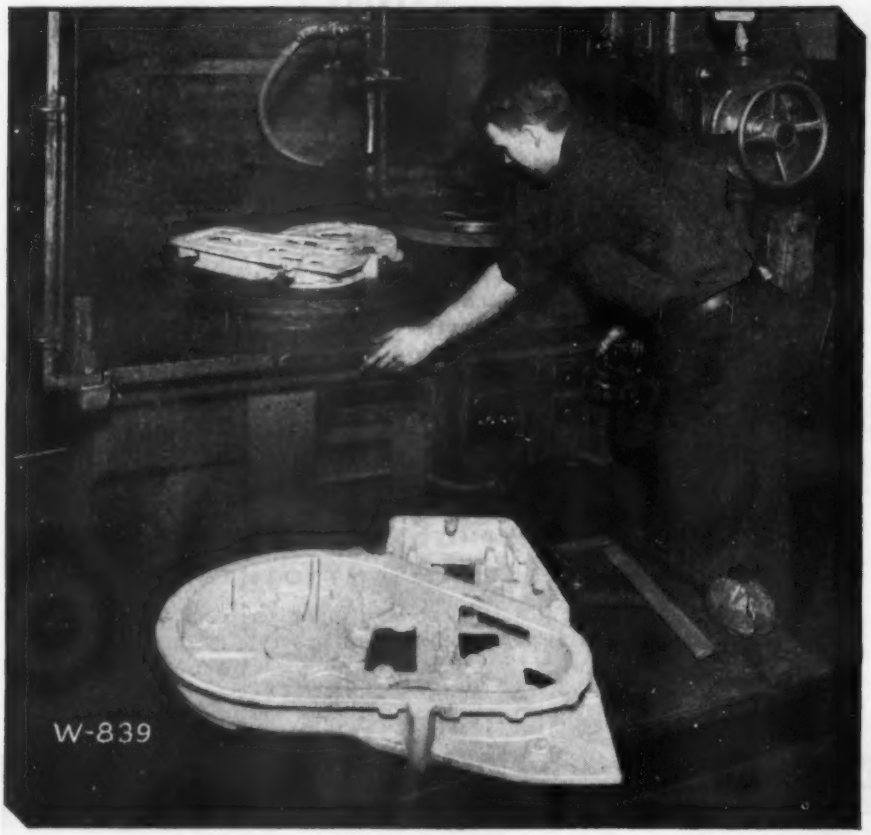
Buy War Bonds

BARBER B-C COLMAN PRODUCTS: HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

"Put it on the Blanchard"



...GET THESE ADVANTAGES

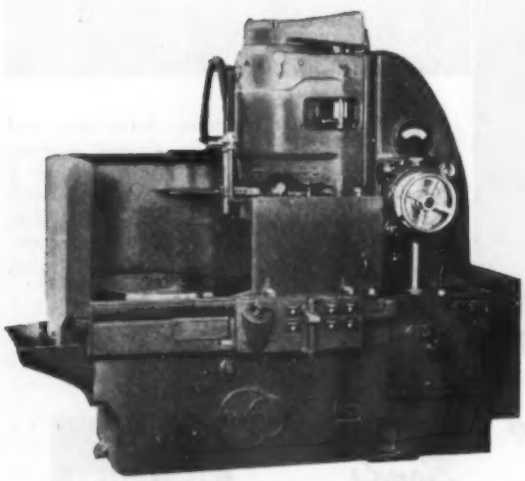
✓ **Production**
Adaptability
✓ **Fixture Saving**
Operation Saving
Material Saving
Fine Finish
✓ **Flatness**
Close Limits

Grinding Aluminum Mounting Plates

Here is another good example of a large but frail piece done on the No. 18 Blanchard Surface Grinder.

These 23½" x 22" aluminum mounting plates are lightly clamped to a steel base plate on the magnetic chuck. Two pieces (4 surfaces) are ground per hour, removing 5/32" from each surface.

When surfaces must be flat and parallel, "put it on the Blanchard".



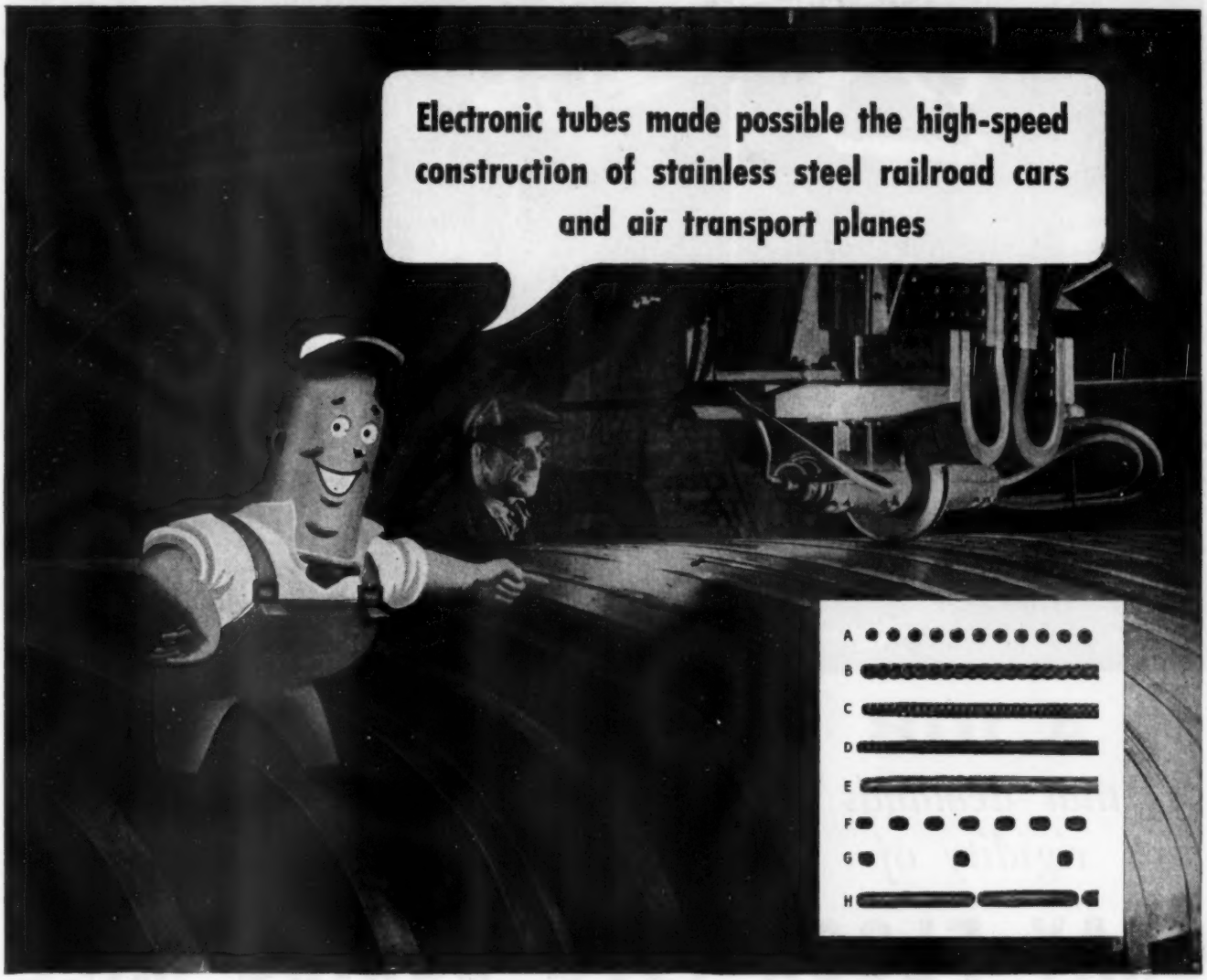
No. 18 BLANCHARD SURFACE GRINDER

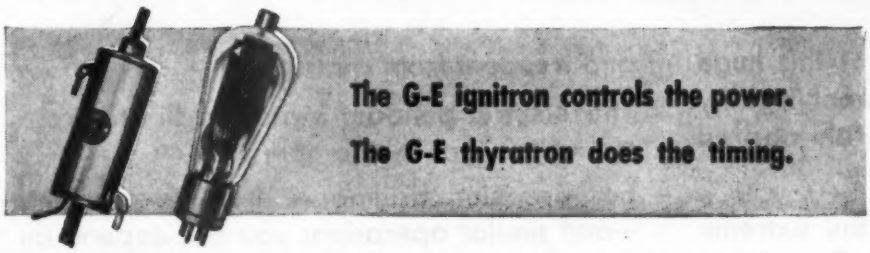
Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.





UNDER electronic control, as developed by General Electric electronic engineers, resistance welding has become a high-speed, precision operation that is making yesterday's impossible jobs a routine part of today's production.

With G-E ignitrons controlling the heavy surges of power required, and G-E thyratrons switching them on and off at lightning speed, seam welds can be spotted at any desired distances apart or brought together in an overlapping or solid line. Operations may be performed at any desired speed up to 1800 or more welds per minute — with exactly the right amount of heat applied at exactly the right spot.

Practically all metals can be electronically spot-welded together, or to other metals — in thicknesses ranging from tissue-thin nickel-copper alloy, 40 millionths of an inch thick, to laps of half-inch steel.

Main illustration shows stainless steel sheets being welded to railroad-car framework. Welder is double-wheel electrode type. Inset illustration shows typical seam welds made at approximately 7 feet a minute: (A to E) from 1⅔ to 21 spots to the inch; (F) essentially equal on-and-off periods; (G) long-off-short-on period; (H) short-off-long-on period.

There is a G-E electronic tube for every industrial purpose. Through its nation-wide distributing system, General Electric is prepared to supply users of electronic devices with replacement tubes.

"HOW ELECTRONIC TUBES WORK"

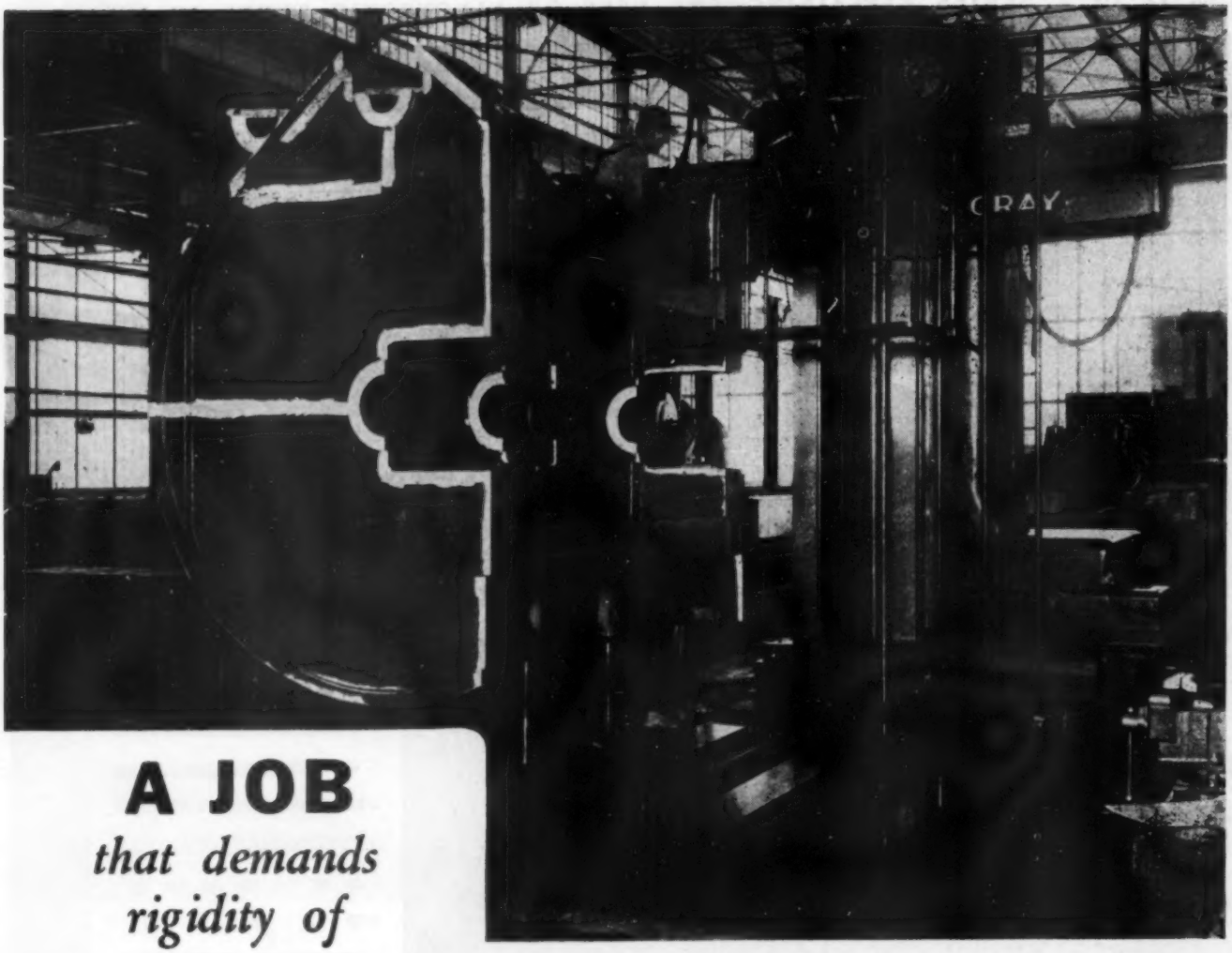
This booklet will be mailed to you *without charge*. Its 24 pages are interestingly illustrated and written in easily understood language. Shows typical electronic tubes and their applications. Address *Electronics Department, General Electric, Schenectady, New York.*

• *Tune in* "The World Today" *and hear the news direct from the men who see it happen, every evening except Sunday at 6:45 E.W.T. over CBS. On Sunday listen to the G-E* "All Girl Orchestra" *at 10 P.M. E.W.T. over NBC.*

G-E HAS MADE MORE BASIC ELECTRONIC TUBE DEVELOPMENTS THAN ANY OTHER MANUFACTURER

GENERAL ELECTRIC

182-C4



A JOB
that demands rigidity of
GRAY FLOOR TYPE BORING MILL

● Milling a pad on the front of this huge press casting requires the inherent rigidity of the Gray Boring Mill to maintain desired tolerance.

Even with the Boring Head at the extreme top position on the column the Gray rigid construction assures dependable accuracy and freedom from chatter.

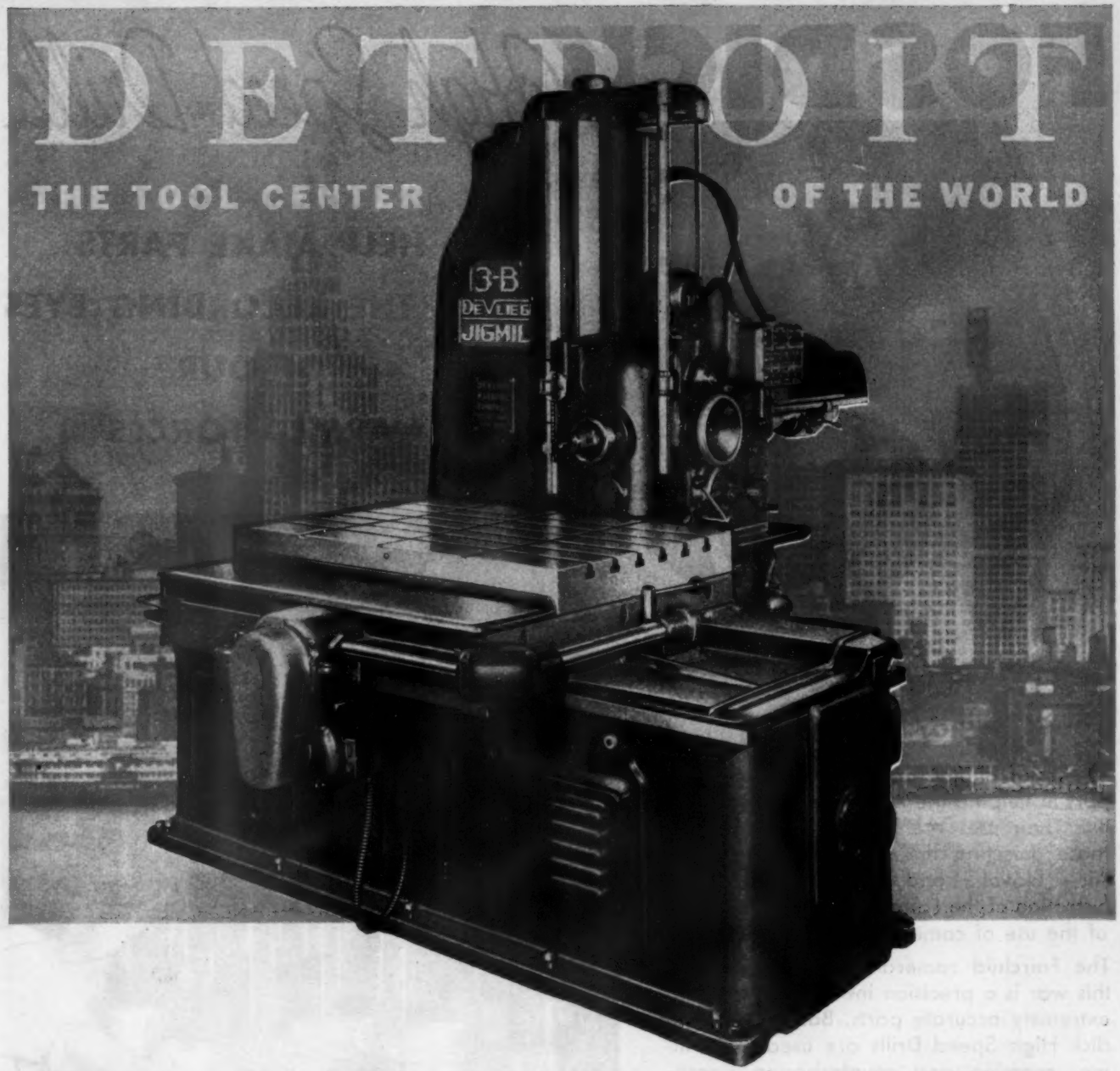
The electric pendant switch facilitates control of the tool by the operator.

For precision drilling — boring — milling —and similar operations you can depend on the Gray Boring Mill to give you the desired accuracy and flexibility of operation.

For complete details ask for new Bulletin No. 48

THE G. A. GRAY COMPANY
Cincinnati 7 Ohio, U. S. A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines.



The World's Finest BORING and Milling Machine is made in Detroit

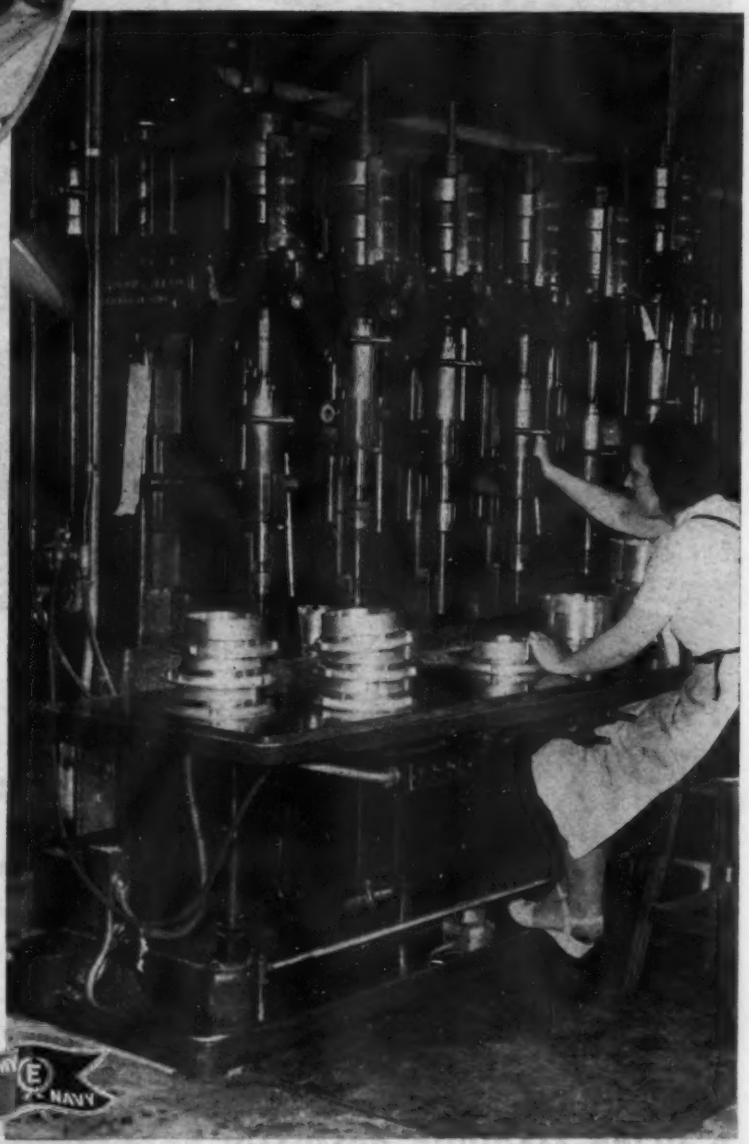
On June 17th we received the Army-Navy white star for continued excellence

This new Model 3-B JIGMIL has automatic power means to position the spindle from one location to another accurately to within much less than .0001 (one-ten-thousandths part of an inch). Thus, extreme laboratory accuracy is conveniently available with ordinary skill that would normally make such precision very high in cost. This, and many other refinements, go further to prove that the JIGMIL Idea is a totally new approach to the problems of precision boring at a new low cost.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

FOSDICK *High Speed Drills*

HELP MAKE PARTS FOR THE RECORDING EYES OF OUR ARMED FORCES



● Aerial photographs are playing a big part in helping the Allies win this war faster. Their uses are manifold and vital to those directing the various operations of Air — Naval — and Ground forces. The illustration of the Fairchild Camera is typical of the use of cameras by our air force.

The Fairchild camera used extensively in this war is a precision instrument requiring extremely accurate parts. Batteries of Fosdick High Speed Drills are used for drilling, reaming and counterboring operations on Fairchild parts.

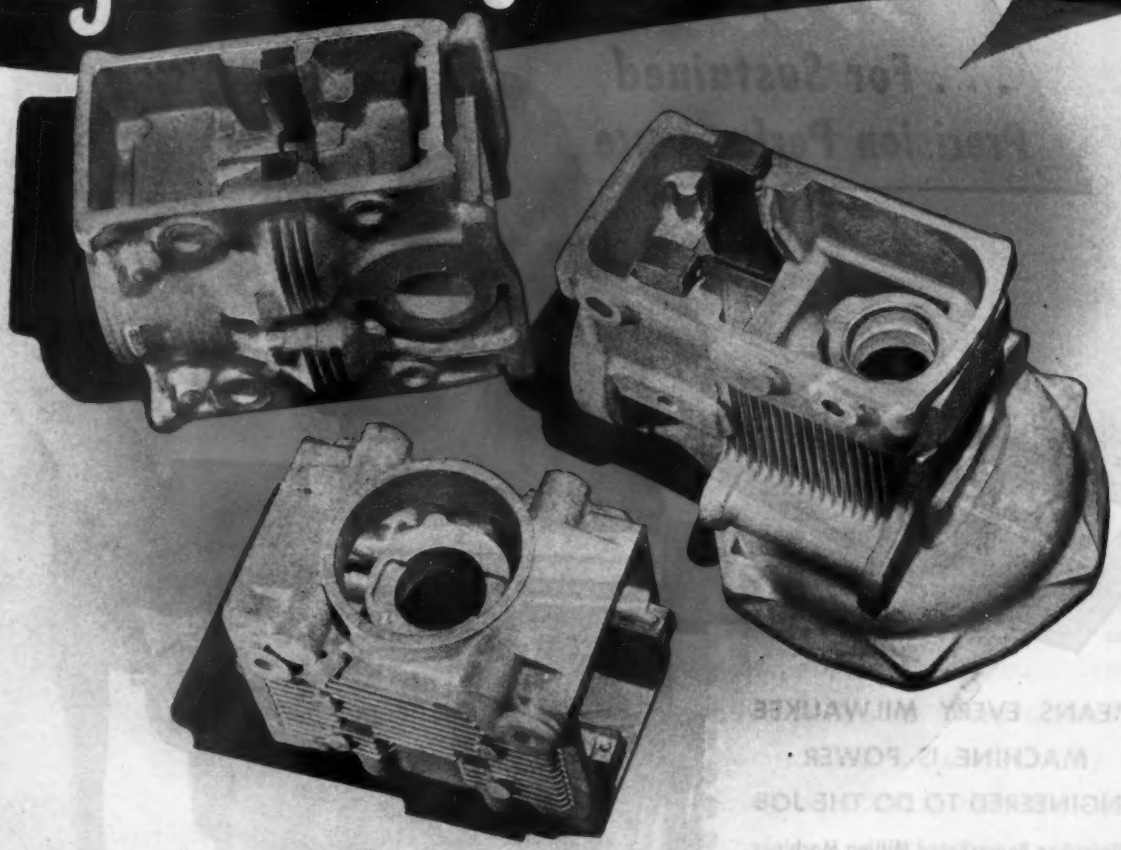
Illustrated is a Fosdick 6-spindle High Speed Drill—drilling shutter housings for Fairchild Cameras. Tolerance on this operation is .002 inch.

If your work calls for precision drilling—reaming — tapping — counterboring — put it on a Fosdick High Speed Drill. There's a type and size to meet your requirements up to 1¼" diameter.

Full information on the mechanical and design features of this machine are contained in the Fosdick High Speed Drill Bulletin H.S.A.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO

Magnetic Magnesium? No, but..



Magnesium permanent-mold castings are made with cast-in steel pole shoes. Thus, airplane magneto housings have the light weight which only magnesium can provide, plus steel's magnetic qualities.

Inserts of other metals, when required, are but one of the advantages offered by Mazlo Magnesium permanent-mold castings. Surfaces are smoother than sand castings and grain structures finer. Dimensional tolerances are closer; parts can have thinner walls. Less metal to machine away, resulting in lower fabricating costs.

Consider the use of permanent-mold castings where quantities are sufficient to warrant the making of molds. Magnesium is now available to manufacturers of other-than-war products, upon WPB approval.

American Magnesium Corporation can take care of your requirements for permanent-mold die and sand castings, forgings, extruded shapes and sheet. For information on the availability of magnesium products, call the nearest office of Aluminum Company of America (Sales Agent for Mazlo Magnesium Products) 1709 Gulf Bldg., Pittsburgh 19, Pa.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

TODAY'S HIGH SPEEDS AND FEEDS DEMAND CORRECT

Motor Power

. . . For Sustained Precision Performance

PoweRated

Engineered for a Specific HP. Range

3K Vertical Machine—milling top surface of arbor brace.

MEANS EVERY MILWAUKEE MACHINE IS POWER-ENGINEERED TO DO THE JOB

Milwaukee PowerRated Milling Machines

- Standard Models — Horizontal, Vertical and Bed Types — available in Motor ranges from 3 to 25 HP.
- C.S.M. (Carbide Steel Milling) machines 20 to 50 HP.
- Special Machines—Consult K&T engineers.

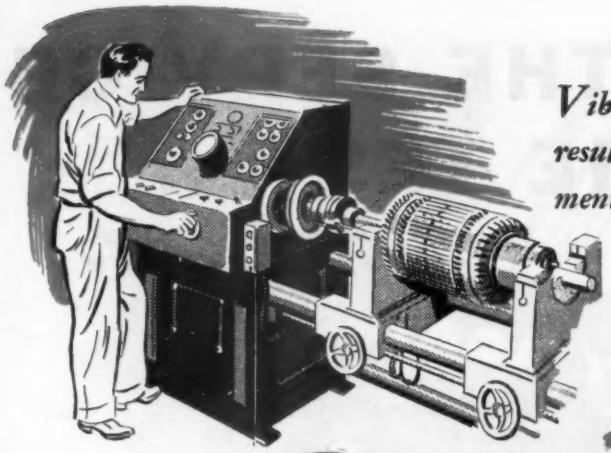
Milwaukee Milling Machines are power-engineered—PoweRated—designed and built for precision performance with balanced power—every machine has a definite power-rating with ample reserve for all overloads normally encountered within its field of job applications.

There is no necessity of changing motors to gain power and speed—the range of models of Milwaukee Milling Machines makes available a specific machine amply powered for every class of job. And you can be sure of sustained precision performance because every machine is engineered and built in proper relation to its power. And remember there is a PoweRated Milwaukee best suited to your specific needs.

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14 WISCONSIN

Milwaukee Machine Tools



Vibration of rotating parts in high-speed apparatus results in undesirable noise and damage to equipment. Here's a cure pump manufacturers are using.

Curing the "Jitters"

ON HIGH-SPEED ROTATING PARTS

Pump runners, weighing from 30 to 1500 pounds, must be accurately tested to make sure they are in exact static and dynamic balance.

Westinghouse *Manufacturing and Repair** Plants, conveniently located in every district, have the special facilities needed for this job. By means of Dynetric Balancing equipment, the exact location and amount of unbalance is accurately determined. Then weight is applied or removed at proper points on the rotating piece to exactly neutralize the vibration effect.

This is typical of the specialized facilities offered by Westinghouse M & R Plants—a nationwide organization with local branches as close as your telephone. Factory-trained men, using factory methods and equipment, are ready to serve you promptly on any problem involving analysis or repair of electrical equipment.

J-90821

WESTINGHOUSE PRESENTS
. . . JOHN CHARLES THOMAS
SUN. 2:30 EWT., NBC.
"TOP OF THE EVENING"
MON. WED. FRI. 10:15 EWT., BLUE NET.

When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

THE TOUGHER THE SERVICE THE BETTER THE TEST...

Many small tools are capable of handling easy jobs with a certain degree of efficiency and economy, whereas on the tough job they might not stand the gaff.

Today, most jobs are tough, calling for tough tools. Then too, because of small tool shortage, all tools must sooner or later be assigned to gruelling service making it imperative that every small tool be capable of maximum performance in long, hard work.

The test of UNION TOOLS is to put them to work under today's conditions and let results dictate the tools you buy. On such a basis UNION will be the "Tools You Buy Again."

THE UNION LINE

Twist Drills—Milling Cutters—Reamers—Hobs—Slitting Saws — End Mills — Taps — Dies — Screw Plates—Profile Cutters.

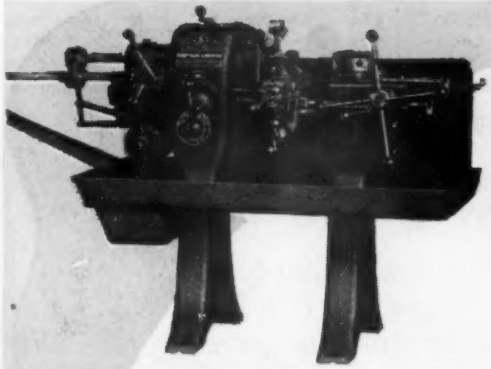
UNION TWIST DRILL COMPANY, ATHOL, MASS.

STORES New York Store: 61 Reade St.; Los Angeles Store: 524 East Fourth St.; Chicago Store: 11 So. Clinton St.; Seattle Store: 568 First Ave., So.; San Francisco Store: 121 Second St.; Detroit Store: 5527 Woodward Ave.

MANUFACTURING DIVISIONS

S. W. Card Mfg. Co., Div.; Mansfield, Mass.
Butterfield Division, Derby Line, Vt., and Rock Island, Quebec

UNION



No. 1 Geared Electric Turret Lathe
5/8" x 5" Turning Capacity

Production is Speeded Up BY ELECTRIC FEEDING AND CHUCKING OF BAR

A gentle pressure on a trigger lever is sufficient to start the automatic cycle. The actual work of feeding out and gripping the bar is done electrically through a cam operated mechanism in less than one second. The day's output is thus increased while conserving the energy of the operator.

Second operation and light chucking work can be handled equally well by the electric collet chuck.

For certain kinds of work the in and out movements of the cross slide can be used to control the feeding of the bar, and the gripping of the work, thus effecting additional time saving.

Bardons & Oliver Geared Electric Turret Lathes have many other outstanding time and labor saving features. So write us for the complete story of what these machines will do for you.

BARDONS & OLIVER, INC.

1133 WEST 9TH STREET CLEVELAND 13, OHIO

No. 2 Geared Electric Turret Lathe 1" x 7" Turning Capacity

Every Belt a Specialist

In Allis-Chalmers' Great New V-Belt Line!

When Allis-Chalmers recommends a certain belt for a certain job, you can be sure it's the *right* belt. Because: 1) the Texrope line is *complete;* 2) Allis-Chalmers invented the multiple V-belt drive, offers engineering advice based on unparalleled experience. Both sound reasons for making Allis-Chalmers your "V-Belt Drive Headquarters."

1

HEAT-RESISTING SUPER-7, made of Buna-S synthetic rubber, has ability to withstand heat built right into it. Standard Super-7 belt, it can successfully operate in ambient temperatures up to 180 degrees F.

2

OIL-RESISTING SUPER-7 specializes in operating under fairly bad oil conditions. Neoprene, a synthetic impervious to oil, grease, other grimy liquids, is the cover for the regular Buna-S Texrope V-belt core.

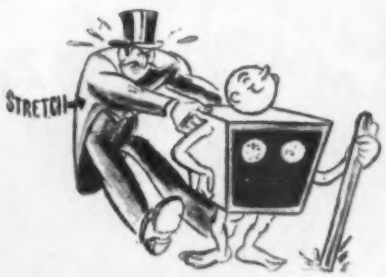
3

OIL-PROOF SUPER-7 is made of solid Neoprene, which is unaffected by most rubber-attacking liquids. It is recommended for drive installations where V-belts are virtually swimming in oil or grease.

4

STATIC-RESISTING SUPER-7 conducts static charge to machine to ground it. Static conducting element is contained throughout belt cover — can't wear off. This belt is used where explosion danger is present.

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*



5

SUPER-7-STEEL employs endless cables of steel to reduce belt-stretch, provide greater horsepower. It is used where V-belt drive centers are hard to adjust, loads to be driven are extra heavy, space is limited.

A 1731

It pays to make

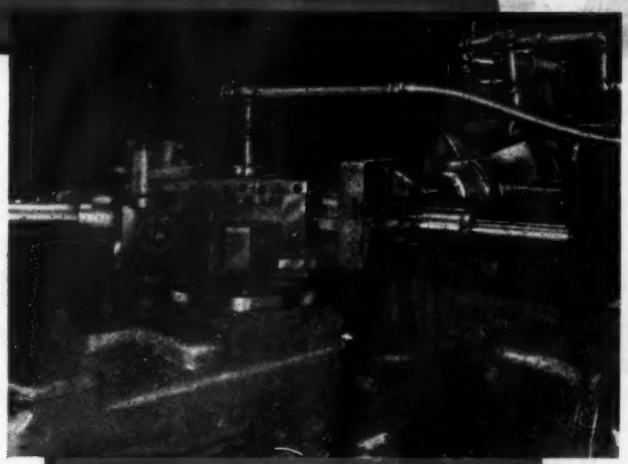
ALLIS-CHALMERS

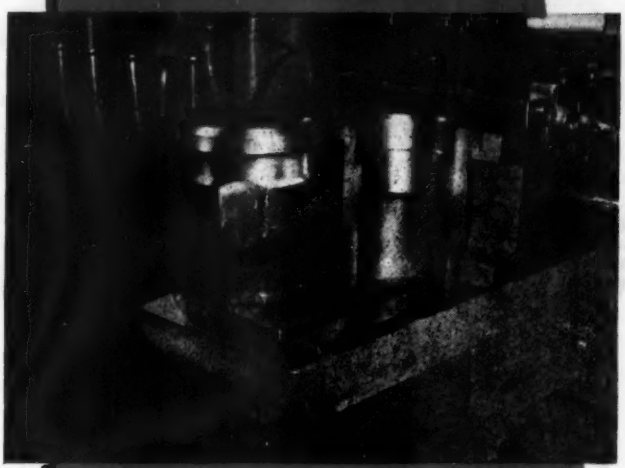
your

V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F Goodrich—and are sold exclusively by A-C.

P & J RE-TOOLING WILL PUT GOOD MACHINES TO FURTHER PRODUCTIVE USE





At the time the model 6 DREL P & J Automatic Chucking and Turning Machine shown here was set up for the job, it was producing airplane parts to close tolerances at the rate of 3.3 pieces per hour. A wide range of operations was involved in the production. No one can foretell when this machine (and others) may be called upon for different work. The fact that obsolescence is a term which can hardly be applied to P & J Chucking Equipment which has been actively in use on war production, means that this machine is still good for further use. Power and sturdiness of construction are backed by potential tooling set-ups which will enable this machine to continue to make outstanding production records.

Potter & Johnston Chucking Equipment can be depended on in the future as in the past for quantity quality production at low cost, an advantage which will be even more fully appreciated when low cost is a "must" on post-war work.

The fact that P & J Equipment can be re-tooled to advantage suggests the importance of giving serious consideration now to ways and means of anticipating tomorrow's production problems. Our engineers are ready to show you how economically sound and practical it is to RE-TOOL.

P & J REBUILDING SERVICE

This service is available to all owners of P & J Equipment who are interested in restoring their machines to original productivity and accuracy. RE-TOOLING can also be handled, if desired, when machines are in our shop for rebuilding.

POTTER & JOHNSTON MACHINE COMPANY

Pawtucket, R. I.

PAY DAY IS A GOOD TIME FOR "PAY-OFF" Buy Bonds

SERVING THE

Petroleum Needs of the Nation

Typical Sinclair Refinery, Transportation and Distribution Units.

- SINCLAIR produces oil from more than 8000 wells located in the United States and Venezuela.
- MANUFACTURES all types of petroleum products in 10 modern refineries processing 90,000,000 barrels of crude oil annually.
- TRANSPORTS 300,000 barrels of crude oil and finished products daily through 14,000 miles of pipe lines; also employs thousands of tank cars and a large fleet of ocean tank ships.
- OPERATES a chain of waterfront terminals from the Gulf of Mexico to New England.
- DISTRIBUTES petroleum products through 2000 wholesale bulk plants which also service a network of many thousands of Sinclair Dealer stations.
- PRODUCES basic material for manufacture of synthetic rubber in one of the largest butadiene plants in the United States.

Sinclair is America's outstanding manufacturer of lubricants.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

5 POTENT POINTS!

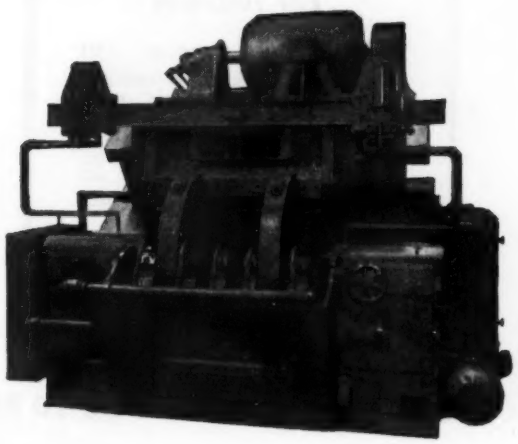
1. We have been building lathes since 1887.

2. LeBlond Lathes today are used on turning operations the world over.

3. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war, gained from thousands of installations is now available to you.

4. Our field engineers are at your service—ready to help you in your development work for the postwar era—particularly along the lines of the difficult, out-of-the-ordinary turning problems.

5. This service is yours for the asking. Contact our nearest dealer or write—



LeBLOND 1-LB CRANKSHAFT LINE BEARING LATHE

ROUGH AND FINISH LINE BEARINGS IN ONE OPERATION

THE R. K. LeBLOND MACHINE TOOL CO.
DEPT. FE46 CINCINNATI 8, OHIO

THERE ARE PLACES

For instance:

FIRTHITE *removes* 730 pounds of gray-iron casting metal per hour instead of 180 pounds;

drills a gun barrel in 23 minutes instead of 1 hour;

enables milling-cutters to run at 1,000 feet per minute instead of 100 feet with previous materials.

Firth-Sterling, long specialists in making steels for shop tooling, early recognized the possibilities of carbides as a means of extending the improvement in shop practice brought about by the super high-speed steel—CIRCLE C. **But, there is a place for both . . .**

Where the highest speeds are obtainable or materials are hardest, FIRTHITE is the "last word" in a cutting material. It is used at speeds up to ten times those possible with high-speed steels.

Where speeds above average are permissible or

SEE THE FIRTHITE MOVIE TO BE SHOWN IN BOOTH No. B-146 AT THE NATIONAL

Firth-Sterling Steel Company

MAKERS OF HIGH-SPEED STEELS, VIM AND DIE STEELS, AND SINTERED CARBIDES

FOR BOTH . . . .

materials are "on the hard side," CIRCLE C will cut *at least* 25% faster than ordinary grades of high-speed steel.

FIRTHITE is available in eight standard grades in the form of tips or blanks, tipped tools, and wear parts. CIRCLE C is supplied in the form of toolholder bits (ready for use), and bars in all standard sizes.

Send for descriptive literature on these remarkable materials. Both are typical of the Firth-Sterling specialties that, for nearly 50 years, have been the key to greater production wherever metal is fabricated.

For instance:

CIRCLE C *machines* hard die blocks in 28 hours instead of 42 hours . . . doubling production between grinds—versus regular high-speed steel;

turns two to ten times more pieces of heat-treated alloy steel between grinds than other high-speed steels.

METAL CONGRESS, CLEVELAND, OHIO, OCTOBER 16 TO 20, INCLUSIVE

Firth-Sterling Steel Company

ANNOUNCING...the New MAGNI-RAY

Model "C"

5" lens provides wider field observation

Designed to simplify and speed up visual inspection, this latest member of the MAGNI-RAY family, the Model "C", has been developed to meet the need for a means of observing a much wider field at one time.

It is encased in a strong, lightweight aluminum alloy casting. For convenience in transporting, the housing is provided with a handle which may also be used for fastening to a machine tool to observe turning and grinding operations.

The lens of the new MAGNI-RAY is 5" in diameter and is of high-grade optical glass, giving clear, undistorted vision of the object under inspection. Housing is attached to a 16" upright rod extending from the base. A universal clamping device permits the lens with its housing to be swivelled up-and-down and side-ways as required. The magnifying device is supported by a 12"x12"x12" triangular cast iron base of sufficient weight to provide rigidity and stability and to prevent tilting.

Light is directed upon work from two 4" long 25-watt tubular bulbs mounted in MAGNI-RAY, the inside of the case being specifically silvered for reflection purposes.

The new Model "C" MAGNI-RAY is especially adapted for detecting cracks, imperfections and blow holes in large castings. It is ideal for military map reading, as well as for use in assembling small, delicate mechanisms, inspection of ground, polished or lapped surfaces. Burrs, surface defects and other imperfect workmanship, not readily apparent to the unaided eye, are quickly detected by means of this new instrument. Inspection, receiving, drafting, machining departments and even first aid rooms have many uses for the MAGNI-RAY because of its almost unlimited field of application.

The MAGNI-RAY is wired for use on 110 volt current, A.C. or D.C. Full information is available promptly on request.

Using the MAGNI-RAY by hand for critical inspection of precision parts.

●

Magnification and visibility of parts inspected by MAGNI-RAY are clearly apparent here.

GEORGE SCHERR CO.
INCORPORATED
200 LAFAYETTE STREET NEW YORK 13, N. Y.

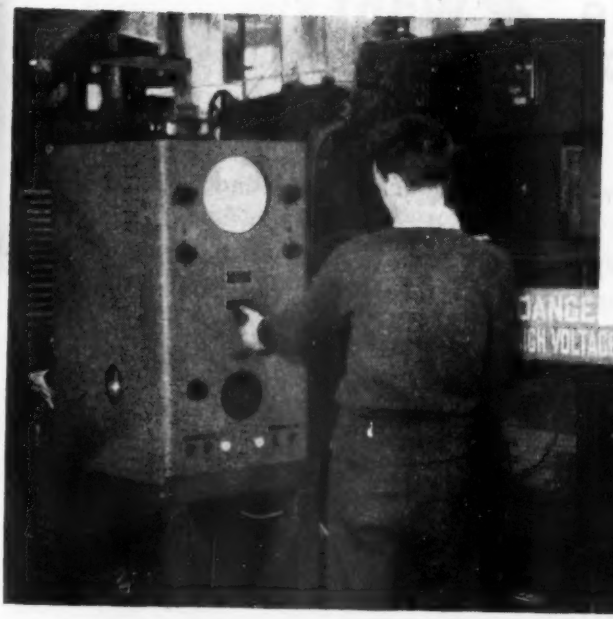
SHORTS STYMIED

Voltage surges which accompany switching and frequent starting and stopping of motors impose high dielectric stresses on the coil insulation, and can cause harmful short circuits. Yet this is an unavoidable condition of service for many motors.

The grinder shown here, for example, starts and stops every time a finished part is removed and a new part inserted. But the two Tri-Clad motors that drive it have been built to withstand safely the voltage surges ordinarily encountered in this type of service. Their ability to "stymie" shorts was proved by *the new General Electric test* described below.

External grinder, equipped with two Tri-Clad motors, installed in the milk-machinery manufacturing plant of the Rite-Way Products Company, Chicago, Ill.

New high-potential, electronic surge-tester verifies strength of TRI CLAD motor windings



This electronic test of insulation makes a "cardiogram" of every Tri-Clad motor winding, ferreting out weaknesses that might lead to shorts caused by voltage surges in service. It tests each turn, coil, and phase group of the windings for adequate insulation strength to withstand the "steep front" high-voltage surges of actual service. First developed and applied by G.E., it's one of the production tests which all Tri-Clad motors must pass as they come off our production lines. – *General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

TRI CLAD MOTORS

Each week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.

After the Ticker Tape . . . what?

The whistles will blow, the bells will toll—we'll shower them with ticker tape and tears of joy—then what?

Then the victory they've won and all the things they've fought for will be in *our* hands to hold . . . We have all the weapons we could want: Productive capacity, technical skills, buying power, and need. How, then, could we possibly fail?

Only by lack of planning now for total peace.

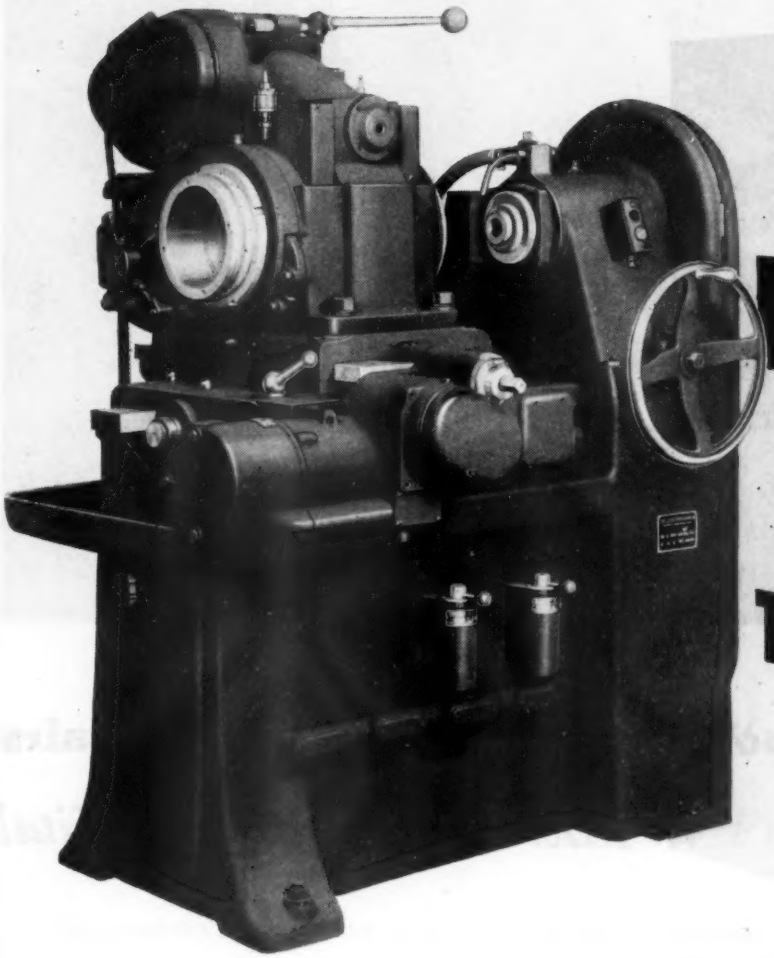
And in this critical hour of preparedness for peace, the engineers of the basic machine tool producers again have a strategic part to play.

They helped the men of government and of industry to plan the most desperate and gigantic production program of all time . . . and they can help those same men now to solve our post-war problems of reconversion.

One of these is a Bryant man. We offer his services to you.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

A FORECAST OF THINGS TO COME...



LEES-BRADNER

Model 40

PRODUCTION THREAD MILLING MACHINE

● The Model 40 originally designed for the high production of precision gears has proved most successful in the numerous plants where it is now installed.

One of these Model 40 Thread Millers operating in a large automotive plant, equipped with nationally known preloaded spindle bearings, increased the spindle speed from a maximum of 430 to 5200 R. P. M. using a solid tungsten carbide multiple thread mill cutter for the production of aluminum parts.

This machine has been in operation for several months producing more aluminum parts—with better finish—at lower costs.

Here again Lees-Bradner advanced engineering ably fulfills a customer's requirements; forecasts future developments and steps ahead with a machine capable of extremely high speeds and the use of special tungsten carbide tools.

Why not consult Lees-Bradner on your future thread milling and gear hobbing problems.

The LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

For Hitting the "Pinpoint" from Five Miles Upstairs

Microhoning Provides Vital

High altitude bomb sights need a certain number of bearing surfaces of almost perfect precision accuracy and surface finish. The amazing accuracy of our bomb sights depends on this near-perfect accomplishment.

The thousands of these bomb sights needed made it necessary to achieve this fine instrument precision at production speed.

Ordinary machining practice can't produce such results—and fine instrument methods just aren't fast enough.

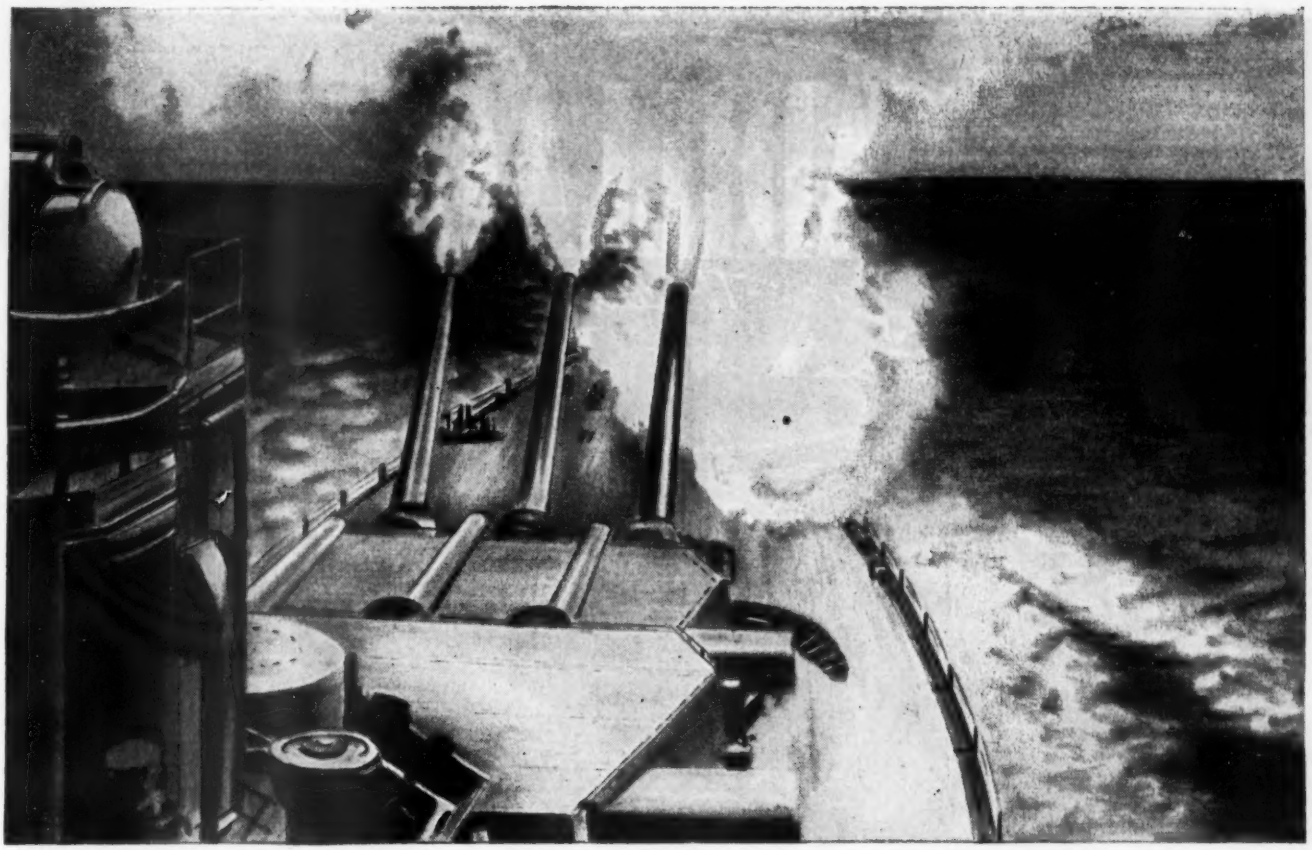
Microhoning bridged the gap. By means of this highly controlled abrading process, the extreme precision needed was obtained at production rates.

This modern final machining process will generate dimensional accuracy to "tenths" and fractions of "tenths", and provide any desired surface finish. It is applicable to the bores of these bomb sight bearings as it is to highly loaded gun turret bearings.

Precision Microfinish Honing will make many important contributions in postwar processing and Micromatic engineers will be ready with many new honing developments.

MICROMATIC
HONE CORPORATION
DETROIT 4, MICHIGAN

MAKERS OF HONING MACHINE TOOLS



. . . or Blasting a "Tin Can" Beyond The Horizon

Precision Bearings in Wartime Production

A battleship gun turret is a complex precision instrument on a gigantic scale. Each complete turret weighs about 1550 tons—as much as an entire medium weight destroyer. This great mass must not only move smoothly, but also very rapidly—guns must be quickly targeted with extreme precision and without backlash. That calls for something extraordinary in the way of bearings.

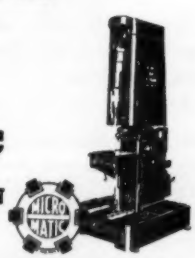
They must be dependable and have amazing accuracy. Inaccuracy or the slightest imperfection of operating fit would destroy the telescope precision needed to make each shot count.

The best ordinary machining methods won't provide the precision nor the fine surface finish necessary for accurate frictionless operation.

Microhoning was found to be the answer. Microhoning is a process of final machining which generates average bore accuracy for roundness and straightness within .0002" to .0003"—which removes up to 65 cubic inches of stock per hour. In production of turret bearings—not only for battleships, but also for cruisers and destroyers—Microhoning has provided the desired combined precision and finish.

And, it will be more constructively useful in coming times of peace than it has been in war production.

MICROMATIC
HONE CORPORATION
DETROIT 4, MICHIGAN



MAKERS OF HONING MACHINE TOOLS

● No matter what standard size Thread Gage you need, whether Ring Gage or Plug Gage, the chances are we have it right in stock—ready to ship at a moment's notice.

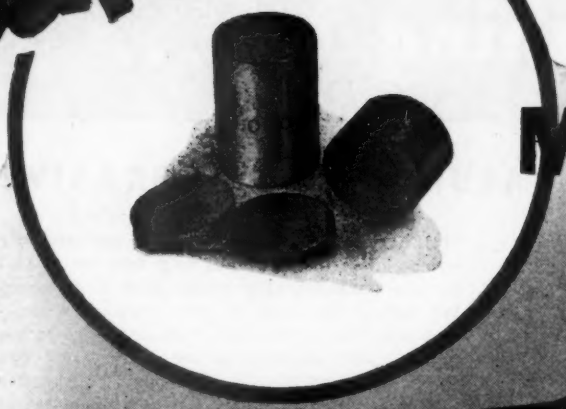
This is because the entire facilities of our plant are concentrated on the production of these two types of gages, enabling us to maintain an unusually complete range of sizes. Occasionally, of course, our stock of some particular size is depleted by an exceptionally large order, but it is only a matter of a few days before it is replenished.

When an emergency arises and you need certain sizes at once, send a wire to Cadillac. Orders received before 4:00 p.m. are shipped the same day.

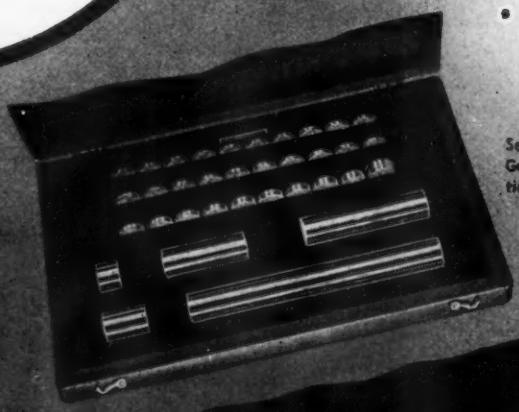
CADILLAC THREAD GAGES CADILLAC

CADILLAC GAGE COMPANY, Detroit 5

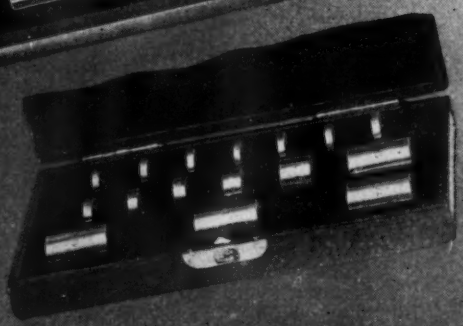
Van Keuren



MICROGAGES



Set MTT MICROGAGES. 35 Gages giving 140,000 combinations $95.00



Set MT MICRO-GAGES. Over 5,000 combinations in thousandths $35.00

A FOUNDATION FOR ACCURACY FOR 25 YEARS

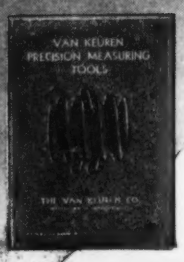
VAN KEUREN MICROGAGES are high precision working gages, designed for use on all ordinary work and economically practical for use in production because of their low cost. Their great value in general shop use lies in the fact that they enable the workman to achieve the accuracy required by the inspector.

MICROGAGES are of first quality oil hardening alloy tool steel, exceptionally hard, carefully seasoned, with accurately flat and parallel mirror-like surfaces. They combine readily by wringing together and because of their size (11/16" dia.) are ideally suited for checking heights, widths, slots, machine set-ups, gage setting and many other uses. They are made round in order to assure the best distribution of wearing surface, which is about equal to that of rectangular gage blocks.

MICROGAGES up to 1" in length have a tolerance of plus .000015" minus .000010". They average 5 millionths of an inch oversize which provides the WEAR ALLOWANCE feature of these gages.

VAN KEUREN MICROGAGES are available in sets especially designed for general shop use, for gage setting and for toolmakers and machinists. Individual MICROGAGES in standard sizes are also available in a size up to 6" in length.

Toolmakers MICRO-GAGE SET M64. Gives 121 combinations. $15.00

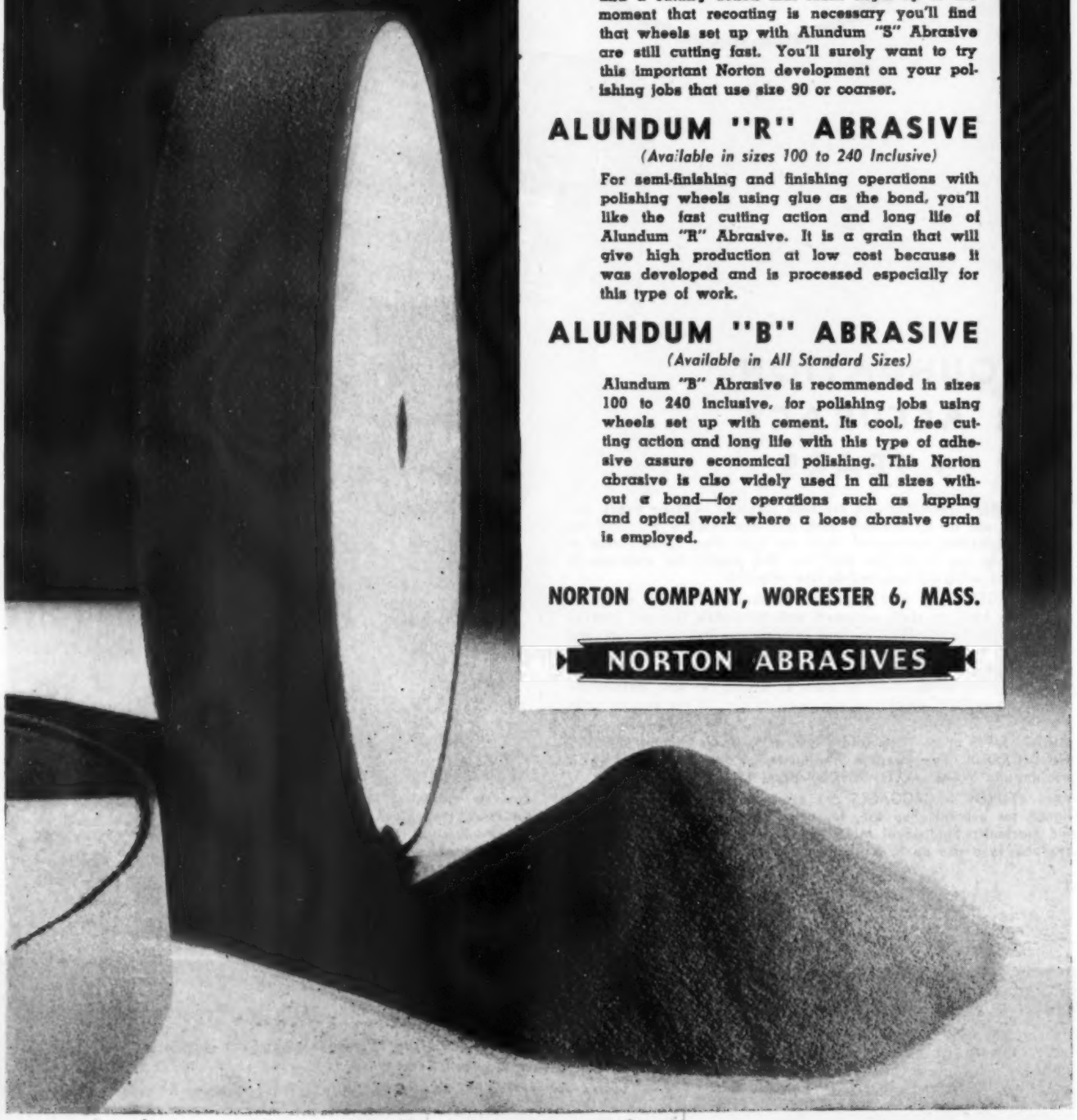


Complete details on MICROGAGES and the full line of Van Keuren Precision Measuring Tools are contained in Catalog No. 32, a 144-page manual for toolmakers, machinists and inspectors—sent promptly on request.

Van Keuren

25th YEAR

The Right Type of Abrasive for Every Polishing Job...



ALUNDUM "S" ABRASIVE

(Available in sizes 90 and Coarser)

This Norton abrasive has proved outstandingly successful in the field. Not only does its special surface treatment give grains with better sticking power but also a faster cutting action—and a cutting action that lasts. Right up to the moment that recoating is necessary you'll find that wheels set up with Alundum "S" Abrasive are still cutting fast. You'll surely want to try this important Norton development on your polishing jobs that use size 90 or coarser.

ALUNDUM "R" ABRASIVE

(Available in sizes 100 to 240 Inclusive)

For semi-finishing and finishing operations with polishing wheels using glue as the bond, you'll like the fast cutting action and long life of Alundum "R" Abrasive. It is a grain that will give high production at low cost because it was developed and is processed especially for this type of work.

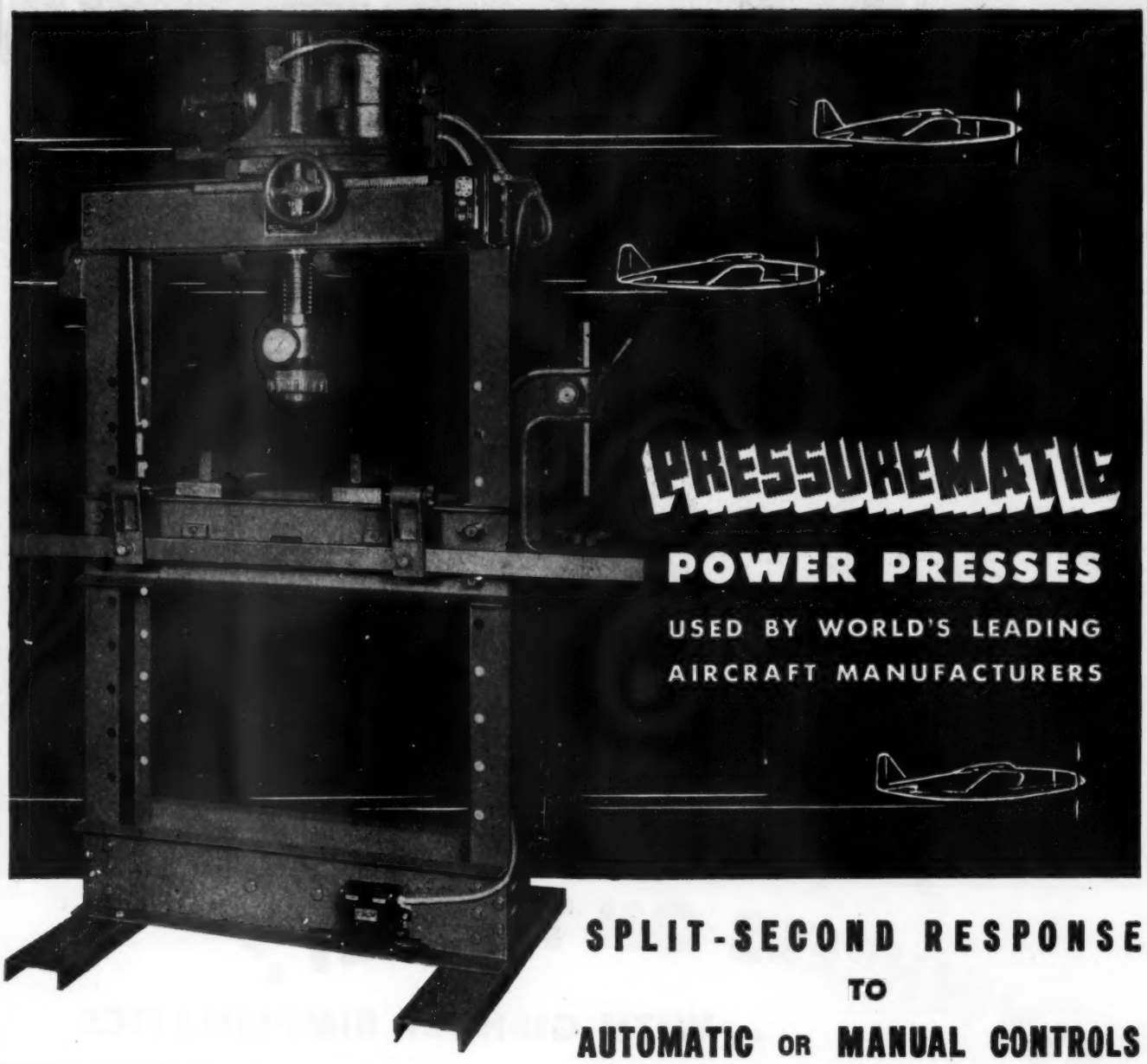
ALUNDUM "B" ABRASIVE

(Available in All Standard Sizes)

Alundum "B" Abrasive is recommended in sizes 100 to 240 inclusive, for polishing jobs using wheels set up with cement. Its cool, free cutting action and long life with this type of adhesive assure economical polishing. This Norton abrasive is also widely used in all sizes without a bond—for operations such as lapping and optical work where a loose abrasive grain is employed.

NORTON COMPANY, WORCESTER 6, MASS.

NORTON ABRASIVES



SPLIT-SECOND RESPONSE TO AUTOMATIC OR MANUAL CONTROLS

★ ELECTRIC AND HYDRAULIC MODELS

★ 20, 40, 60 TON CAPACITIES

★ CEILING PRICED

★ GOOD DELIVERY!

Automatic control can stop ram at any pre-set pressure. Conventional foot-control can stop automatic operation instantaneously at any time for maximum safety. You have a choice of variable ram travels, speeds, and pressures. This flexibility makes the PRESSUREMATIC the ideal press for assembling, press-fits, bending, straightening, die try-outs, and duplication of work pressures. Adjustable bolster; movable ram head; reset type hand switch. Builds up from zero to 60 ton pressure in 4 seconds! Many other exclusive features.

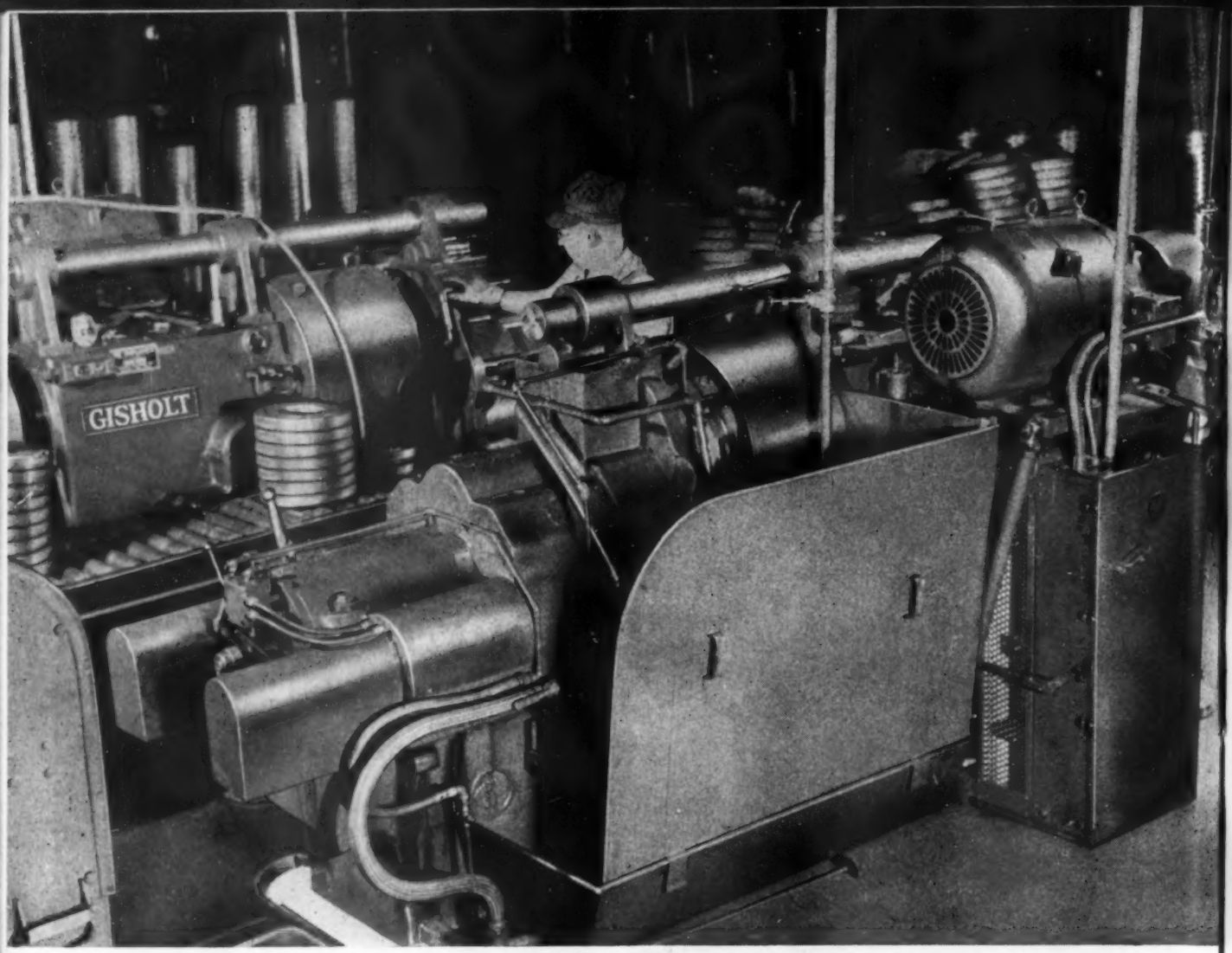
AUTOMATIC PRESSURE CONTROL

The pressure control system can be set to reverse ram at any pressure, and automatically continue up and down stroke cycle of the ram until the foot switch is released. Automatic pressure control is optional. It holds spoilage to minimum, and enables even inexperienced operators to attain high production speeds.

WRITE FOR CATALOG

LEMPCO

5711 DUNHAM RD. • BEDFORD, OHIO, U.S.A.



FLYWHEELS ON THE FLY!

... WITH GISHOLT SIMPLIMATICS

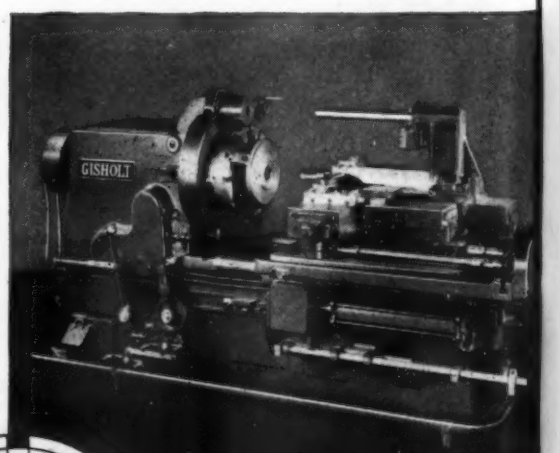
Wherever you have the volume, consider the advantages of the Gisholt Simplimatic.

With the ability to out-produce several manually operated machines—to relieve the pressure on skilled hands... to cut costs 50% and more—the Simplimatic may be the practical answer to more than one of your production problems.

Why more than one? Because the Simplimatics provide the extreme flexibility in tool arrangement to handle a wide variety of between-centers and chucking work. Gisholt engineers will gladly explain the Simplimatics to you in complete detail. Or write us for literature.

GISHOLT MACHINE COMPANY
1201 East Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turning

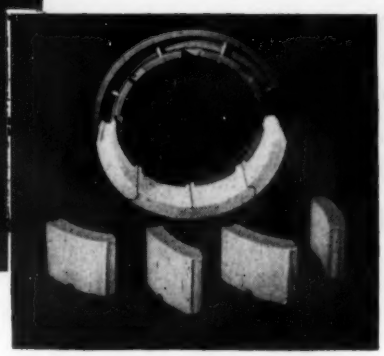


GISHOLT

GISHOLT SIMPLIMATICS are built in both platen and radial types. Easy to operate, one man can usually tend two, or even three, machines. No high degree of skill is required.

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

LET'S RING IT AGAIN!



Every Sterling Grinding Wheel We Make Is Dedicated To Limitless Progress In A Free, Unshackled America

America is at the cross-roads. Never before has a Presidential election meant more to the future of our country. Where we put that "X" on our ballots is mighty important this year! The issues to be decided are not of the moment, but may alter for all time our established, American way of life. The results of this election are far-reaching . . will affect you, your children and their childrens' children. This year's vote is both a national and personal matter.

Whatever happens, capitalism will remain. It is the bedrock of our Democracy . . as essentially democratic as the town pump! Neither labor nor management would change our economic set-up, because both realise our capitalistic system has made us the greatest nation on earth. The "common man" in America has uncommon advantages that outweigh all "isms". However, there are different kinds of capitalism. Under the one, you make your own decisions; under the other, they are made for you.

America is in favor of private enterprise—freedom for G. I. Joe to return home, start a business, and prosper without unwelcome help . . or interference. America wants open competition—an unfettered opportunity to put our billions to work on profitable investments. America is in favor of unrestricted liberty for all—not domination by any group—government, labor, or management!

Yes, your vote is important this year! It calls for serious thinking. Every American has a stake in the decision you make as you enter the voting booth. All of us must ask ourselves what we are about to gain, not what we are about to lose.

The Liberty Bell—let's ring it again!

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

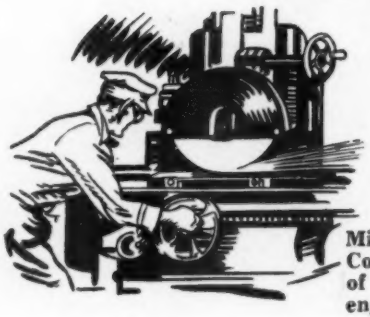
TOO TOUGH FOR ORDINARY WHEELS

MID-WEST Super-Cut TAKES IT IN STRIDE

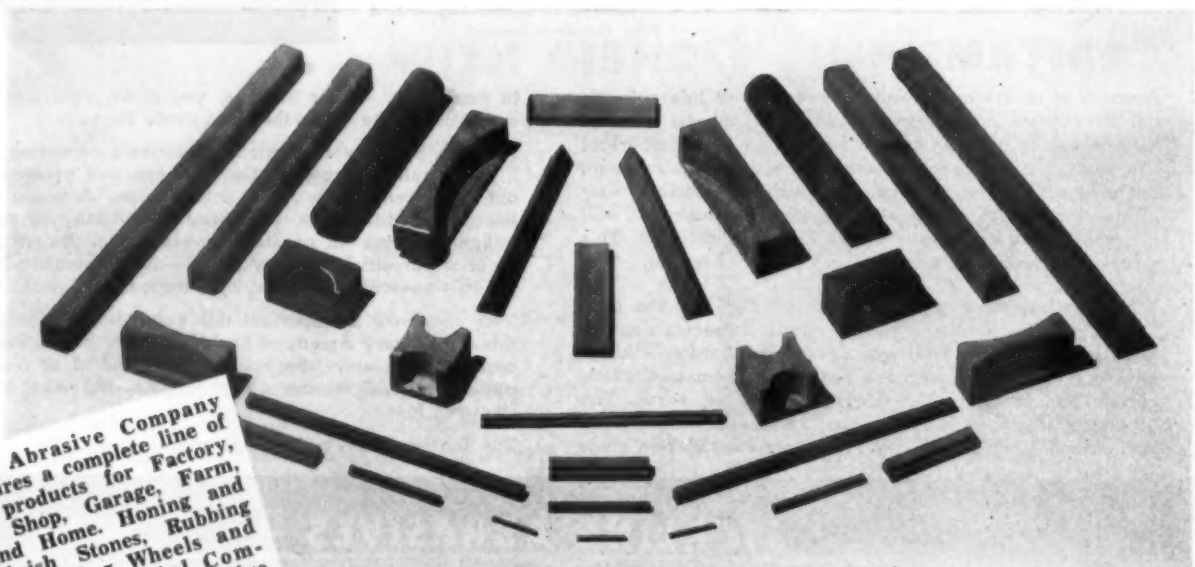
MID-WEST Super-Cut grinding wheels are unusually cool cutting—virtually eliminating all hazards of over-heating costly and irreplaceable tools.

Mid-West Super-Cut wheels are made with our No. 2 grain (special aluminum oxide) which provides the necessary ruggedness for dependable performance and longer life.

Super-Cut wheels cut remarkably fast, and this advantage when combined with the well known Mid-West quality and careful workmanship insures the utmost in efficiency and economy.



Mid-West Abrasive Co. maintains a staff of experienced field engineers.



Mid-West Abrasive Company manufactures a complete line of abrasive products for Factory, Machine Shop, Garage, Farm, Office and Home. Honing and Super-Finish Stones, Rubbing Bricks, Grinding Wheels and Sand Papers—Special Compounds and many other Abrasive Specialties. Jobbers and Factory Representatives located throughout the United States.

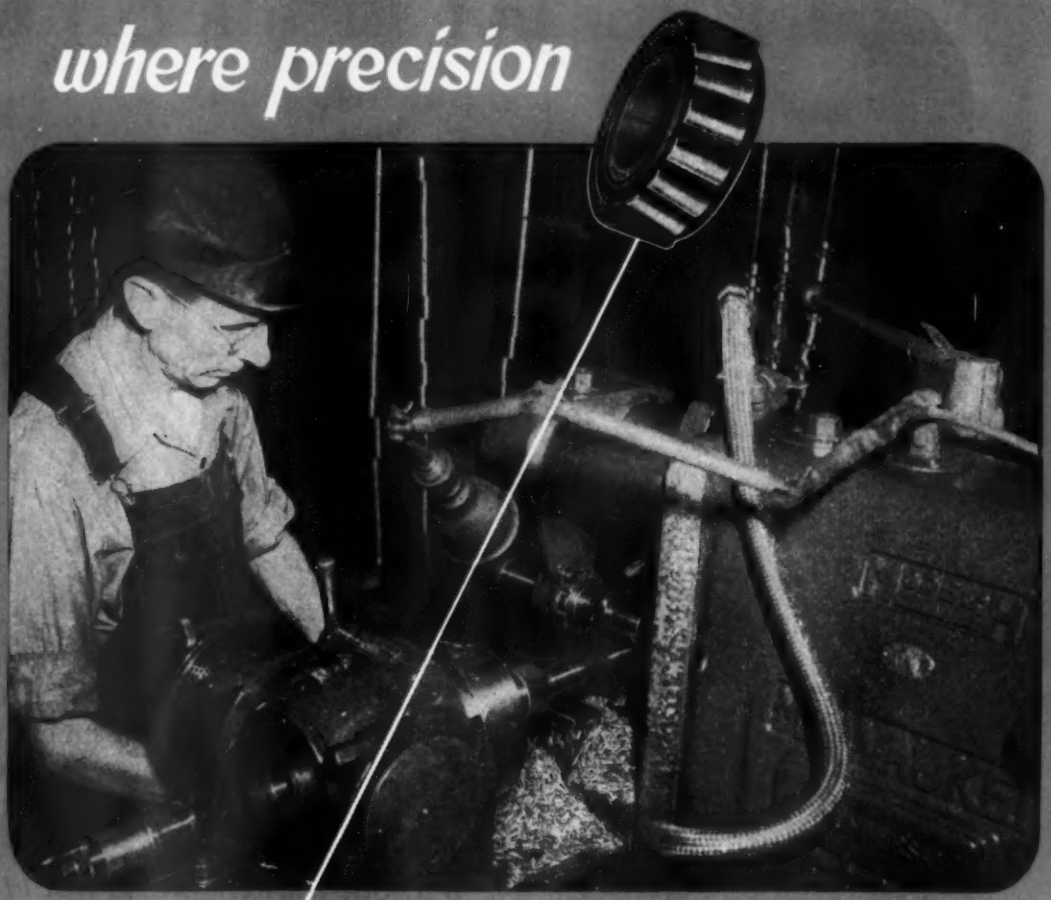
DETROIT 11, MICH.

MID-WEST ABRASIVE COMPANY

1960 E. MILWAUKEE AVENUE

Manufacturers of DEPENDABLE Abrasives

where precision



BEGETS PRECISION

This 4H Universal Milwaukee Milling Machine equipped with a Model K Universal Dividing Head is milling an important part for another Milwaukee Milling Machine, namely the clutch sleeve which fits into the saddle.

It's an example of precision being employed to produce precision and it is characteristic of the performance of all Kearney & Trecker machines wherever they are used; precision to which the liberal use of Timken Tapered Roller Bearings makes a large contribution.

The number of Timken Bearings used in each model Milwaukee Milling Machine varies to some extent, but in general they are used on the spindle, speed gear change mechanism, quick-change feed box, pick-off feed box, spindle reverse gear bracket, table, and pulley drive bracket, as many as 26 being applied in some machines.

Over a long period of years, the Kearney & Trecker Corporation has proved it pays to include Timken Bearings prominently in their formula for precision. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

then he thought to himself

"WHY WAIT 'TIL YOU'RE CORNERED?"

AT his recent reception in Washington, General DeGaulle and General Pershing were deploring the havoc of the war and hoping some good might result. DeGaulle remarked that perhaps Mahomet had something when he ventured the statement:

> *"Without war, the world would be in a condition of stagnation."*

It is a sad commentary on human inertia that men must wait until the gun is jabbed in their ribs before they will stir themselves to great effort.

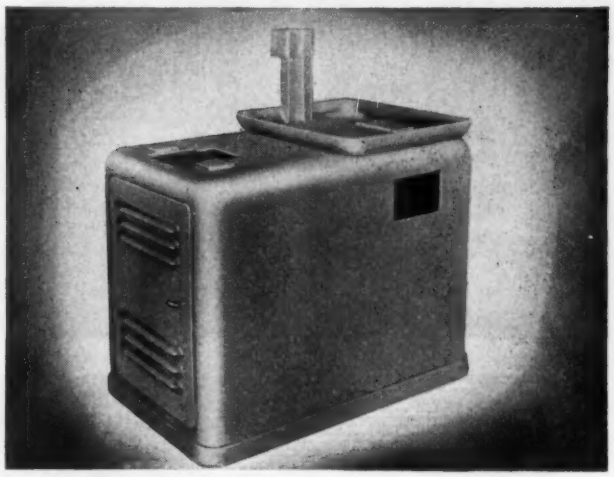
But it seems a fact that men usually wait for a crisis before they get bold and take hurried recourse to the best means for liberation.

Even today, some business men are waiting for the pointed guns of competition before taking action. And others . . .

"WHY WAIT 'TIL YOU'RE CORNERED?" *he says*

LOOK, GENERAL, how some are beating the gun of competition through recourse to Arc Welding.

GUN BEATER: Lower Costs. Arc Welding permits the use of all types of steel and all kinds of shapes to suit available production equipment, and to match service requirements. This freedom means faster reconversion, faster production and saving of materials for lower costs. Many designers will use tubular construction, such as this bomber engine mount.



GUN BEATER: Better Products. Modern, streamlined designs will get the nod in postwar markets. Machines . . . appliances . . . locomotives . . . or what have you—they can be made good-looking at *low cost* with Arc Welding. The base for a small machine, shown above, is an example.

GUN BEATER: Originality. Welded steel construction opens the door to unlimited ingenuity for the creation of unusual designs, such as this giant machine for stretching aluminum shapes. It is 100 ft. long. Assembled in 7 sections. Stroke is 58 ft. Withstands a pull of 350 tons.

Call a Lincoln Engineer for advice on how to beat the gun in the production of better products at lower cost with Arc Welding.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

Grinding SMALL parts

or HEAVY pieces

with equal accuracy and ease

HILL "Open Side" Hydraulic Surface Grinders are amazingly versatile on production work and final finishing operations where surface accuracy must be maintained within very close limits. HILL "Open Side" design affords maximum accessibility to the work and the fully hydraulic table and cross feeds insure smooth, positive operation. HILL "Open Side" Horizontal Spindle Hydraulic Surface Grinders are built in table widths of 18", 24", 30" and 36". Standard table lengths range from 5 to 20 feet. Bulletin 844 gives complete details of operation.

Also Built in Vertical Spindle Design

The HILL ACME Co.

6400 BREAKWATER AVE • CLEVELAND, OHIO

Would You Go to a Baker for Legal Advice?

● Sure! A baker may be *willing* to give you legal advice, but could you bank on its trustworthiness? By the same token, users of milling machines have learned from experience that properly engineered arbors are a prerequisite to successful machine operation.

It really takes a milling machine specialist to build milling machine arbors. Kempsmith has specialized in the design and manufacture of milling machines and accessories for *more than a half century*. That's why Kempsmith has the necessary ability and experience to produce arbors to meet your individual requirements.

Available in all popular sizes and types, and adaptable to any make of milling machine with standardized spindle, Kempsmith Arbors and Accessories are regularly carried in stock for immediate shipment.

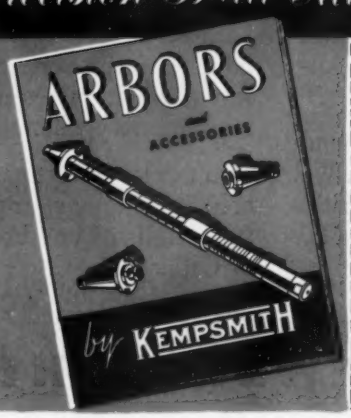
Write today, regarding your needs.

BUY YOUR ARBORS FROM AN **ARBOR** SPECIALIST

KEMPSMITH

Precision Built Milling Machines Since 1888

NEW ARBOR BULLETIN
Gives helpful arbor information . . . explains how to keep them in good condition. Fill in and mail coupon for your copy. No obligation.



THE KEMPSMITH MACHINE CO.
1823 South 71st Street, Milwaukee 14, Wis., U. S. A.

YES, I'm anxious to get the right type of arbor for my milling machine. Send me copy of your Arbor Bulletin No. 116.

Name_____

Title_____

Firm_____

Address_____

A 4490-1P-C

Plan Now FOR POST-WAR PRODUCTION

SOUTH BEND 16" TOOLROOM LATHE

While war production is still America's No. 1 job—the time to look ahead to the greatest era of peace-time production is now. Placing orders immediately for post-war machine tools is the first step in reconverting to peace-time production. It means earlier delivery which will permit quicker reconversion—a very important competitive factor.

To manufacturing plants, large and small, where future-planning includes new lathe equipment, South Bend Lathe Works offers a practical post-war priority plan.

You can place your order now for any South Bend Lathe. No deposit or down payment is required. We ask only that your order be placed in good faith. Each order that is received will be acknowledged by a numbered Post-war Priority Certificate.

BUY WAR BONDS NOW...

SAVE FOR LATHES

When civilian production is resumed, lathe orders will be filled in the order established by the certificate numbers. Today's prices will apply unless conditions beyond our control necessitate changes. The order may be cancelled at any time. All South Bend Engine Lathes, Toolroom Lathes, and Turret Lathes, embodying improvements developed to meet exacting war production requirements, will be available. No revolutionary changes in design are contemplated.

Don't delay investigating this effective plan that will help strengthen your post-war position. Write now for full details of our Post-war Priority Plan and a copy of Catalog 100-C.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 37 YEARS **SOUTH BEND 22, INDIANA**

Federal BALL BEARINGS

CAREFULLY MANUFACTURED
PERFECTLY FINISHED
TOUGH STRONG
DURABLE

THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

REPRESENTATIVES LOCATED AT

Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 902 S. Wabash Ave.—5 • Los Angeles: 5410 Wilshire Blvd.—36

Short Cut ON MACHINING NITRIDED STEEL

SUNOCO
EMULSIFYING CUTTING OIL
speeds cutting of aircraft cylinders at 266 S.F.P.M.

Shortening the cutting time on vital machining operations is one important way Sunoco Emulsifying Cutting Oil is aiding our successful war production effort.

Airplane engine cylinders, for instance, were needed in a hurry. Working with tough nitrided steel, on Jones and Lamson 16" Heavy Duty Fay Automatic Lathes, a cutting lubricant was needed that would permit maximum cutting speed . . . without sacrificing accuracy or finish. On the basis of past experience a 20 to 1 mixture of Sunoco was recommended. The results speak for themselves. The 5/16" cut was made at a speed of 266 S.F.P.M., with all other requirements satisfactorily met.

Flooding tools and work with Sunoco Emulsifying Cutting Oil has been a universal means of speeding cutting operations for years. Sunoco's high heat-absorbing and lubricating qualities make possible longer tool life, greater accuracy, and finer finish.

Today, in your own shop, under your own operating conditions, the advantages of Sunoco can be applied wherever a soluble cutting oil is used. Sun Cutting Oil Engineers — experts in solving metal working problems — are at your service to analyze your cutting oil needs and make proper recommendations. Call your nearest Sun Oil Company office or write

SUN OIL COMPANY • Philadelphia 3, Pa.

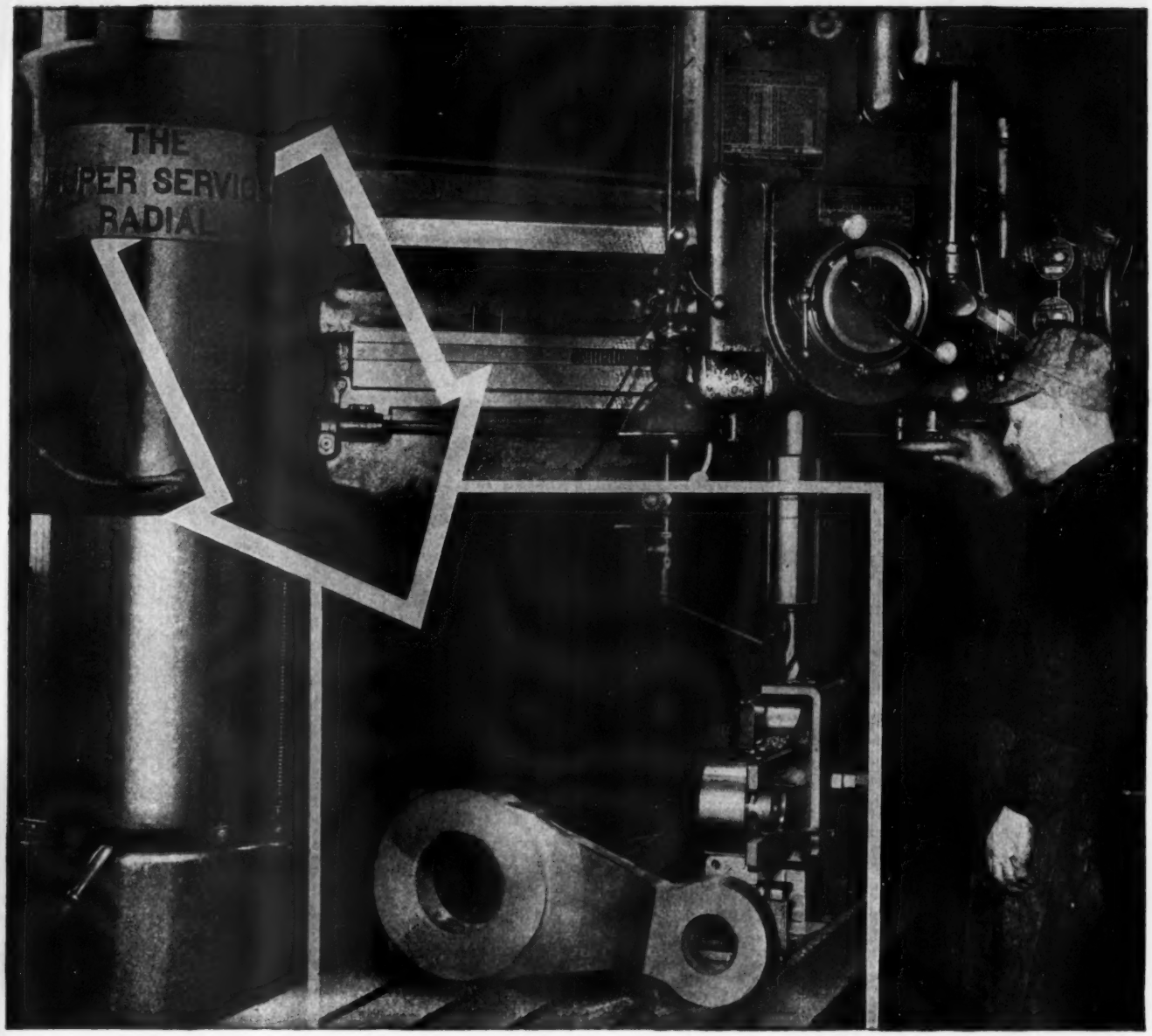
Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

PERFORMANCE DATA

OPERATION—Machining Airplane Engine Cylinder.
MACHINE—Jones & Lamson 16" HD Fay Automatic Lathe.
MATERIAL—Nitrided Steel.
CUTTING SPEED—266 surface feet per minute.
SPINDLE SPEED—116 R.P.M.
DEPTH OF CUT—5/16 inch.
FEED—.018 inch.
CUTTING LUBRICANT—1 part Sunoco to 20 parts water.
TOOLS—12 Cemented Carbide.

SUNOCO **SUN INDUSTRIAL PRODUCTS**

HELPING INDUSTRY HELP AMERICA



Another VITAL Application of the SUPER SERVICE RADIAL . . .

CINCINNATI BICKFORD
ENGINEERING SERVICE
IN THE INTEREST OF
VICTORY

The Cincinnati Bickford Tool Co. is now developing drilling machines that produce victorious results and will continue to hold those high standards for many years to come. The Engineering Staff is not satisfied to rest on laurels that won their Super Service Metal Drilling Machines the slogan of More Holes per Dollar, but they are ever searching for improvements that will continue to keep the Cincinnati Bickford Tool Company's name in that category of one who builds machines that drill MORE HOLES PER HOUR.

ARMY E NAVY

RAILROAD PRODUCTION

Drilling to close parallelism is an important operation at the American Locomotive Company Plant. The parts so drilled are eccentric cranks which are to be bolted to main crankpins. Long holes are required; specifications call for drilling these holes closely parallel to the vertical center lines passing through both bearings. The machine used for this precise operation (illustrated above is the **Cincinnati Bickford Super Service Radial with numerous features to insure consistently accurate performances in high speed production of numerous vital products needed for America's gigantic Victory output.** Write to Cincinnati Bickford for detailed information on all models of Super Service Radials and Upright Drills.

THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI OHIO, U S A.

The ABC's of Turret Lathe Tooling

A GUIDE TO BASIC TOOLING PRINCIPLES THAT HELPS LEARNER, APPRENTICE AND EXPERIENCED TURRET LATHE OPERATORS

64 PAGES *of simple, understandable text crammed with photographs, drawings and diagrams that make it easy for operators to analyze jobs, to plan tooling setups, multiple operations, combined cuts, etc.*

This valuable book has been made available under actual cost to encourage turret lathe operators to become better craftsmen, by using their heads as well as their hands.

THIS new book shows in detail just how to set up and produce practically all types of bar and chucking work on turret lathes. Any turret lathe operator, old-timer as well as apprentice, can learn from this tooling guide and become more valuable to himself and his employer. Anyone interested in metal turning can obtain this book. Many companies will want to get it in quantities for distribution in their turret lathe departments. Just send your order to The Warner & Swasey Company, Cleveland 3, Ohio.

WARNER & SWASEY · CLEVELAND · OHIO

Special price to those interested in Turret Lathe tooling, 50c. Send coin, check or money order only. (No stamps please.) If mailed to Ohio address, add 2c Ohio Sales Tax.

The Operators' Service Bureau
THE WARNER & SWASEY CO.
Cleveland 3, Ohio

Enclosed is $_____. Please send ( ) "HOW TO MACHINE PARTS ON TURRET LATHES" to
Please Print.
Name _____
Address _____
City _____ Zone _____ State _____

USE THIS HANDY COUPON
to get single copy quickly or to order in quantity.

The "Feel" About Reconversion

THE "EXPERTS" have been telling us what to expect after the war. The only trouble is that they don't agree among themselves.

One predicts a $120,000,000,000-a-year economy for the United States, whereas another gloomily forecasts that things are likely to be terrible, with many millions of workers searching vainly for jobs.

No one really knows the answer, and obviously no one can until more of the factors influencing reconversion are revealed.

Nevertheless, it is possible to get the "feel" of industry regarding its future. Frequently the state of mind has a powerful influence in determining the events themselves.

To get this "feel" we have conducted a survey of our own among a cross-section of metal-working companies. The results are encouraging beyond our hopes.

We found one of our long-held suspicions confirmed—that reconversion for a large number of manufacturers will be accomplished within a very short time after it is started. A long time lag will be unavoidable in some cases, but it will be the exception rather than the rule.

We found that most companies expect to employ considerably more people after the war than before and are making their plans accordingly.

We found that only a small percentage of companies have asked the government for aid during the war in the form of new plants or production equipment.

We found that most companies have already decided to buy new machine tools and other plant equipment in swinging back to civilian production. Many of them anticipate making heavy investments of this kind. What is more, a large proportion of the companies *know today what they want to purchase as soon as permitted.*

We found that an impressive percentage of companies are planning to branch out into the manufacture of new products or to broaden the range of their prewar products without actually venturing into brand-new fields.

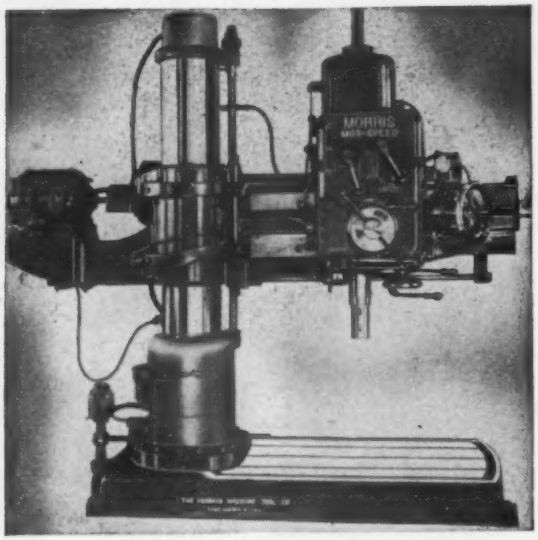
All of this gives the "feel" that the metal-working industry is not downcast about the future. The industry does not think that the country's industrial economy is headed for bad times.

Instead it leans toward the belief of Mr. Baruch that reconversion can be an "adventure in prosperity."

Burnham Finney

Engineered for the job

MORRIS *Special Multiple Drilling Machine*



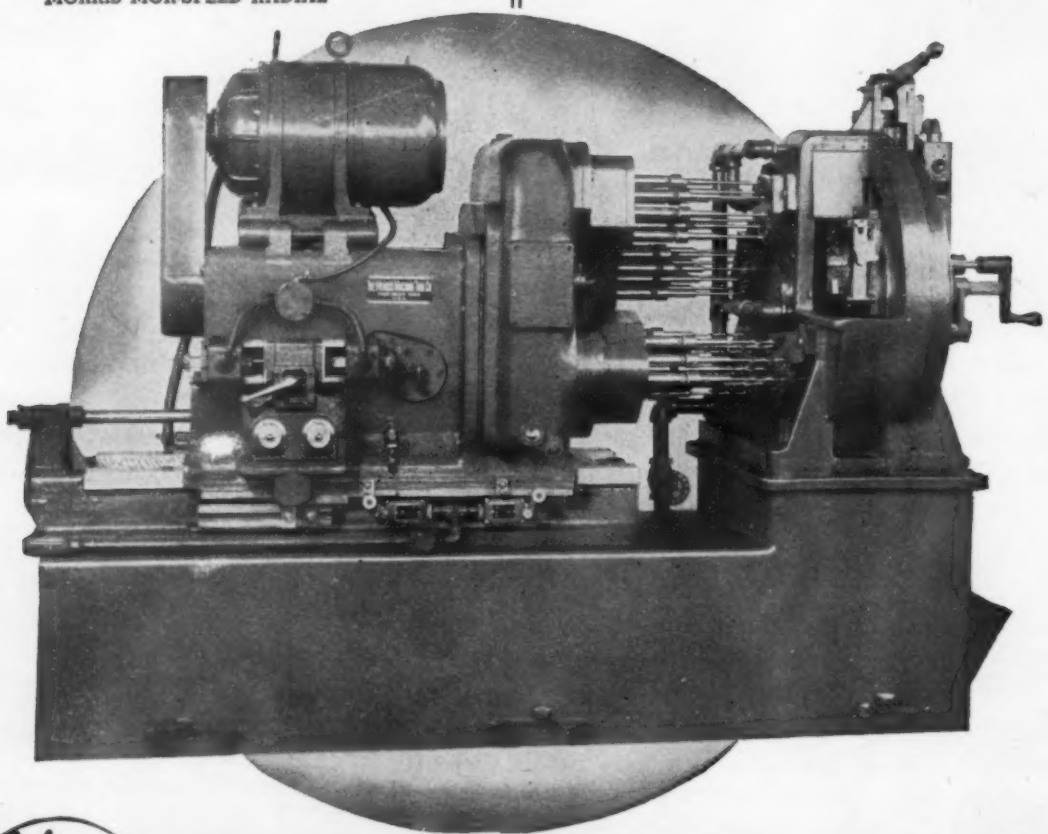
MORRIS MOR-SPEED RADIAL

• Many alert manufacturers are thinking today in terms of tomorrow's production. Plans are being formulated for new products, new processes and new methods of production.

Here's a typical example of a high production, single purpose machine designed to handle the drilling and reaming of bolt and pin holes in pump suction bodies—at a minimum cost per piece.

This machine has a 7½ H.P. hydraulic feed unit arranged for 32 spindles and electric controls for feed and reversing head motion. The 5 station indexing turret is provided with hand clamp fixtures so arranged that work may be loaded and unloaded while machine is in operation. Thus production is governed by the time of the longest operation.

If you are confronted with a production problem involving drilling, reaming, boring and tapping operations—or if you are contemplating a job requiring one or more similar operations consult Morris Engineers on equipment designed and built for your specific problem.



Builders of MOR-SPEED *Radials*

The MORRIS *Machine Tool Co.*

CINCINNATI 3, OHIO

Economies of Welded Fabrication Sure to Attract Postwar Industry

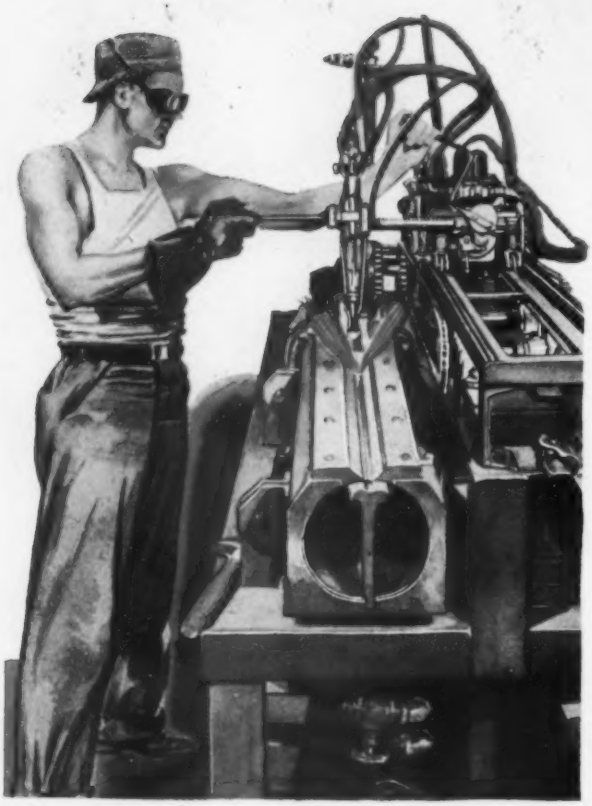
WHEN THE SMOKE of battle clears away, welding will be found to have an assured place as a production tool. For the performance of our workshops on scores of war products has been directly dependent on the application of this process.

Hundreds of plants and thousands of workmen are today familiar with the art of welding who had little experience with it in pre-Pearl Harbor days. This acquisition of know-how and an appreciation of what the process means in metal-joining economies are certain to influence postwar manufacturing practice.

Not that welding is new to the metal-working industry. It served its apprenticeship through years as a "putting-on" tool, used mostly for repair and maintenance work. Later it was applied as a time-saving means of making jigs and fixtures, avoiding the wait and cost of supplying a foundry pattern and casting before materials became available to the toolroom.

Often the jaundiced eye of suspicion plagued welding's progress. What lay beneath those wavy beads? Real fusion of metal or merely a false joint ready to split and fail when the welded member was stressed?

True enough there were, and still are, good and bad welds, just as there are good and bad craftsmen. But the unknowns and variables of welding technique have gradually retreated before the onslaught of engineering research and improvement in equipment. Today inspectors know what is under that bead. They can predict the results from the method employed, and can determine the soundness of a weld with a high degree of accuracy.



An oxyacetylene torch is mechanized to weld a seam on a cylindrical ammunition container. The upper faces of the fixture are water-cooled

Any consideration of welding must start with the fact that the term does not define a single process, but a family of processes, each member of which has achieved a hard-earned position in metal fabrication. Each member competes against each of the others, against other methods of joining metals, such as bolting and riveting, and against other forms of material, such as forgings and castings. All of which makes for progress. For, if there is one point of agreement on postwar industry, it is that it will be highly competitive, that every product and process will have to justify itself in terms of high quality and low cost.

Gas welding, the grand-daddy of the family, still finds wide application because of its flexibility and the low initial cost of equipment. A common way of fusing metals with gas is through the use of the familiar oxygen and acetylene bottles which carry the combustible gases under pressure. In production plants, where thousands of cubic feet of gas are used daily, the cost of handling containers is a major factor. The investment in cylinders is several times the cost of the gases they contain which means that there must be a rather fast turnover in order to avoid mounting costs due to capital tied up in idle equipment.

A cure for this condition is found in the handling of oxygen in liquid form to large consumers. The liquid oxygen is transported to the user's plant in tank cars whence it is put into storage tanks still in the liquid form. When ready for use, the oxygen is gasified through suitable control valves and piped to the points of application. One modification of this plan for intermediate users is to ship the oxygen in liquid form, but to gasify it as it is transferred to the plant's storage tank.

Another method of oxygen handling is through the use of truck trailers up to 40,000 cubic feet capacity. A typical installation is to provide a shed for three trailers: one on the line, one in reserve and a space for replacement. When the first trailer is empty the second is automatically cut in the line, and a signal light indicates that a replacement should be ordered.

The chief point is that a modern plant doing much welding should be piped for gas just as it is wired for electricity. In such installations the user invariably generates his own acetylene, thus eliminating entirely the handling of steel bottles.

Pressure Welding Makes Strong Butt Joints

A new development in the oxyacetylene process, known as a pressure welding, is used for making butt joints. The two faces to be welded are cleaned of oxide and foreign matter, and then butted together under pressure. The entire joint is simultaneously heated by a sufficient number of oxyacetylene flames. As the area attains the proper welding heat, the material becomes plastic and the applied load upsets the joint. Since no outside material is added, the joint is as strong and ductile as the base material and of identical chemical composition.

The process has been used on rolled, cast and forged sections, and even for joining metals of different chemical characteristics. It has been applied to such diversified products as rails on main line tracks, overland pipe lines for liquids and gas, oilwell drill stems, boiler and heater coils, airplane landing gear struts, and pressure tanks. The speed of the process is exemplified by the production of a butt weld in 24-in. diameter overland pipes in approximately 1½ min.

Oxyacetylene welding lends itself to automatic application. The torch is mounted on a track and motor driven along the seam, with or without the addition of filler rod, according to the demands of the job. The workpieces are held in a jig. The method has been used in making steel ammunition boxes, a high production job which forms a contrast to the intermittent and versatile applications of gas welding.

A wide use of the oxyacetylene process has been in the preparation of materials for welding. It affords a low-cost and effective means of cutting shapes from steel plates, and in scarfing the edges of plates to make the proper welded joints. Flame cutting is widely used for preparing plates for electric welding as well as for gas welding.

Equipment for this use is well developed. Straight and circular cuts can be made by self-propelled carriages. Several torches can be used to cut shapes in multiple to any desired contour by having the carriage follow the path of a stylus in contact with a master templet. Multiple-torch set-ups are also used in plate-edge preparation.

Arc Welding Made War Production Possible

The uses of arc welding expanded by leaps and bounds during the war years. In this process, drops of molten metal are carried from the electrode into the weld by means of an electric current.

Between 1932 and 1939 the use of electrode increased from 5 lb. per ton of rolled steel shapes and sheets to only 9 lb. When the war came along, however, and the process was applied to ships, tanks, gun mounts, submarines, and many other products, the consumption of electrodes jumped to 47 lb. per ton of rolled steel shapes and sheets in 1943, an increase of over 500 per cent. During the history of arc welding there has been a continued development to apply the process to different metals and to greater thicknesses of metal. It is safe to say that for every new alloy or metal developed, welding electrodes will also be found.

Arc welding got its big impetus through the use of the shielded-arc electrode. Formerly, when a bare electrode was fused, certain oxides and other inclusions became part of the weld bead. These unpredictable additions to the fused metal meant a loss of ductility and sometimes flaws in the welded joint. A coating applied to the electrode protected the metal against oxidation and gave a cleaner, tougher weld. This innovation had the effect of making arc welding acceptable for a wide number of applications.

While vertical and overhead welds of high quality can be made the flat, or "down-hand" position is preferred. For this reason hand or power-operated

Holes are flame cut in a boiler head in this multiple torch machine. The process is used also for cutting steel plate prior to welding

positioners have been developed, some of them of dramatic size, to turn the workpiece to the desired angle.

One useful application of arc welding lies in hard-facing soft metals. A wide variety of alloys are available for such service, some of them self-hardening and some responding to heat-treatment. They afford an easy way to impart wear resistance to selected surfaces of machine parts while retaining the machining and shock-resisting advantages of the soft metal for the body of the piece.

Plow shares and cement plant conveyor screws which receive grueling service through contact with highly abrasive materials are but two examples in which hard-facing has proved itself of value. Gas welding is also used to apply wear-resistant alloys.

Savings Possible Through Automatic Arc Welding

Attempts in the past to traverse or rotate the work in the fixtures during the arc-welding operation led to the development of automatic arc welding. Possibilities of this process are intriguing. The automatic control dispenses with the human element to a great extent, insuring sound, uniform welds. The use of electrodes in the form of wire, fed from a reel, eliminates the loss of a stub end on each rod, and greatly reduces the interruption to the process inherent when rods are used. Automatic welding naturally raised some problems which have been vigorously attacked because of the obvious desirability of the method, particularly in long welds or repetitive operations.

One necessity was to supply the welding current to the electrode while it was being fed into the arc. This can be readily done by means of brushes in the case of bare rods. Indeed automatic arc welding had received considerable attention in the days when only bare rods were available, but suffered set-back when the metallurgical advantages of coated rods dictated the use of shielded-arc electrodes in most instances.

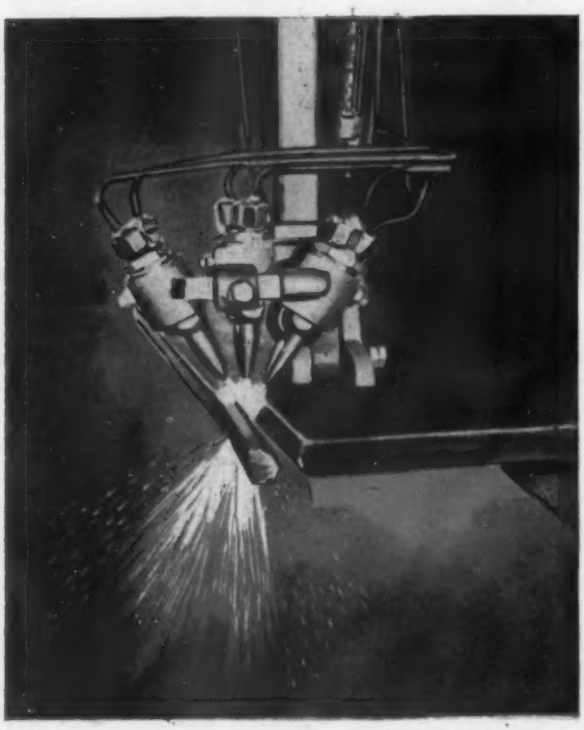


Plate edges can be prepared quickly by flame scarfing. Here three torches are used simultaneously to prepare the plate for a double V weld

The problem was to devise a method of obtaining the advantages of the shielded-arc process together with the automatically fed electrode. One solution was to use a light coating. The rod, in wire form, was knurled to give indentations in which the coating would lie while retaining sufficient exposed area on the rod to provide a good contact for the brush. Light coated electrodes produce welds with good hardness but low ductility.

A second method was to apply the coating in the form of a tape. Taping devices pass the electrode wire over a brush, and then wrap the tape carrying the welding flux around the wire as it is fed downward. This method has the advantage of giving a heavier coating, desirable for full protection against oxidation. The tape can also be used to carry certain alloys into the weld, thus reducing the number of kinds of electrodes necessary to meet varying applications. The tape is made with cotton yarn running longitudinally and with wire crosswise, so that it will retain its shape when wrapped around the electrode.

Still another process which has received a tremendous boost during the war is that known as "submerged melt" welding. This method employs a powdered flux or "melt." The flux when heated is in itself a conductor of electricity and thus dispenses with the need of a flashing arc with its danger of splatter as the weld is formed. It protects the fused metal from oxidation, and removes impurities by forming a slag which rises to the surface. In addition it covers and insulates the bead to give slower cooling which lessens the danger of internal strains. Alloys may be added to the melt just as they are to the tape. Uniform feeds and high currents can be used in the submerged melt method to give it a welding rate of from three to ten times as great as hand operation.

Gases as well as solid materials are used to shield the electric arc, and are particularly advantageous for some applications. Atomic hydrogen arc welding, for example, uses a stream of hydrogen gas to prevent

oxidation of the metal being welded and the electrode itself. The hydrogen in its dissociated form burns with a yellowish flame to generate a large evolution of heat which facilitates the welding process. The progress is particularly useful on stainless steel in light gages such as used on aircraft exhaust collectors and heat exchangers.

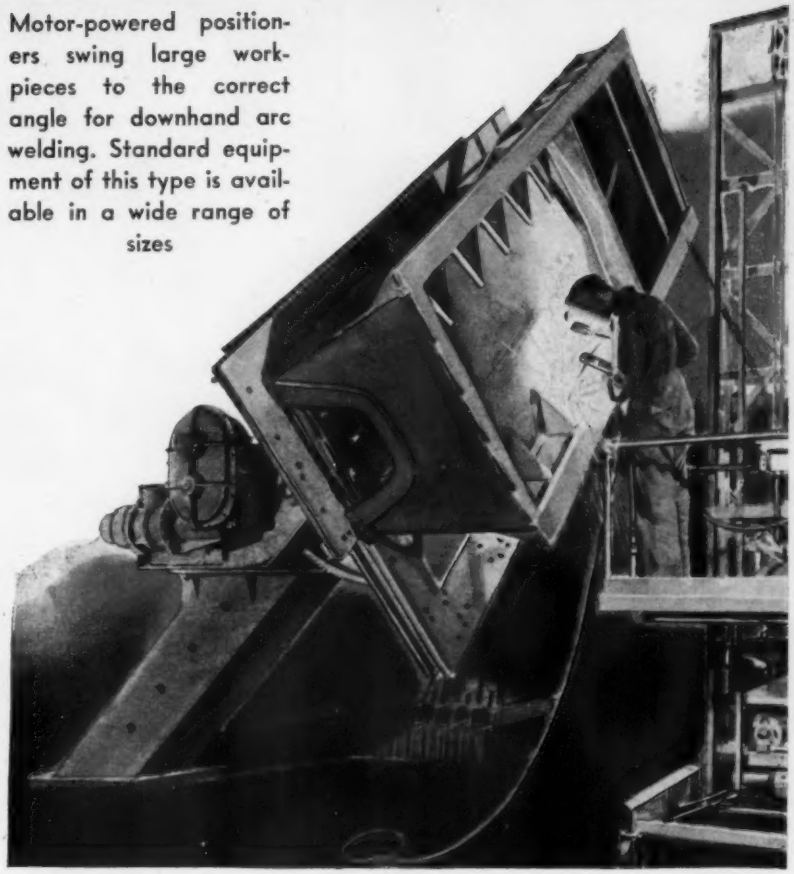
A still newer development is the use of helium or argon to provide an inert gas shield around either a tungsten or carbon arc electrode in welding magnesium alloys. Gases protect the magnesium from igniting and make possible the formation of a clean weld. The process is used to repair magnesium castings and also to weld magnesium sheets such as are used for airplane wing tips.

Early applications of arc welding used direct current as it was thought that the unidirection tended to carry the metal globules along with the current to facilitate fusion. During the war there has been a rapid growth in alternating current arc welding. For one thing the newer process eliminates "arc blow" which is caused by distorted lines of magnetic force often present when direct current is used. Arc blow may cause spatter or an uneven bead, either of which is objectionable.

A. C. arc welding also has the advantage of simplicity of equipment and increased efficiency. In fact, its only real limitation is the lack of suitable electrodes for non-ferrous metals and certain special alloys. This limitation is a result of the retarded development of electrode coatings with the required ionizing characteristics needed to maintain an arc with alternating current. Especially in welding thin metals, the a. c. arc becomes unstable and tends to go out easily, frequently spoiling the weld.

One solution to the problem is to superimpose a high-frequency voltage wave on the welding current. The high-frequency voltage keeps the arc stream ionized during the reversal of low-frequency welding current. Thus the high frequency acts as an arc stabilizer and maintains a firm control of the small welding current. Already this development has expedited aircraft production and the manufacture of other products from thin gage metals.

One of the attractive points about arc welding is that it makes the joint as strong as the part being joined. In an aircraft strut application for example, where failure would be critical, a 100 percent weld efficiency was counted on and maintained. In this instance, however, the automatic submerged melt process was employed thus eliminating the human element.

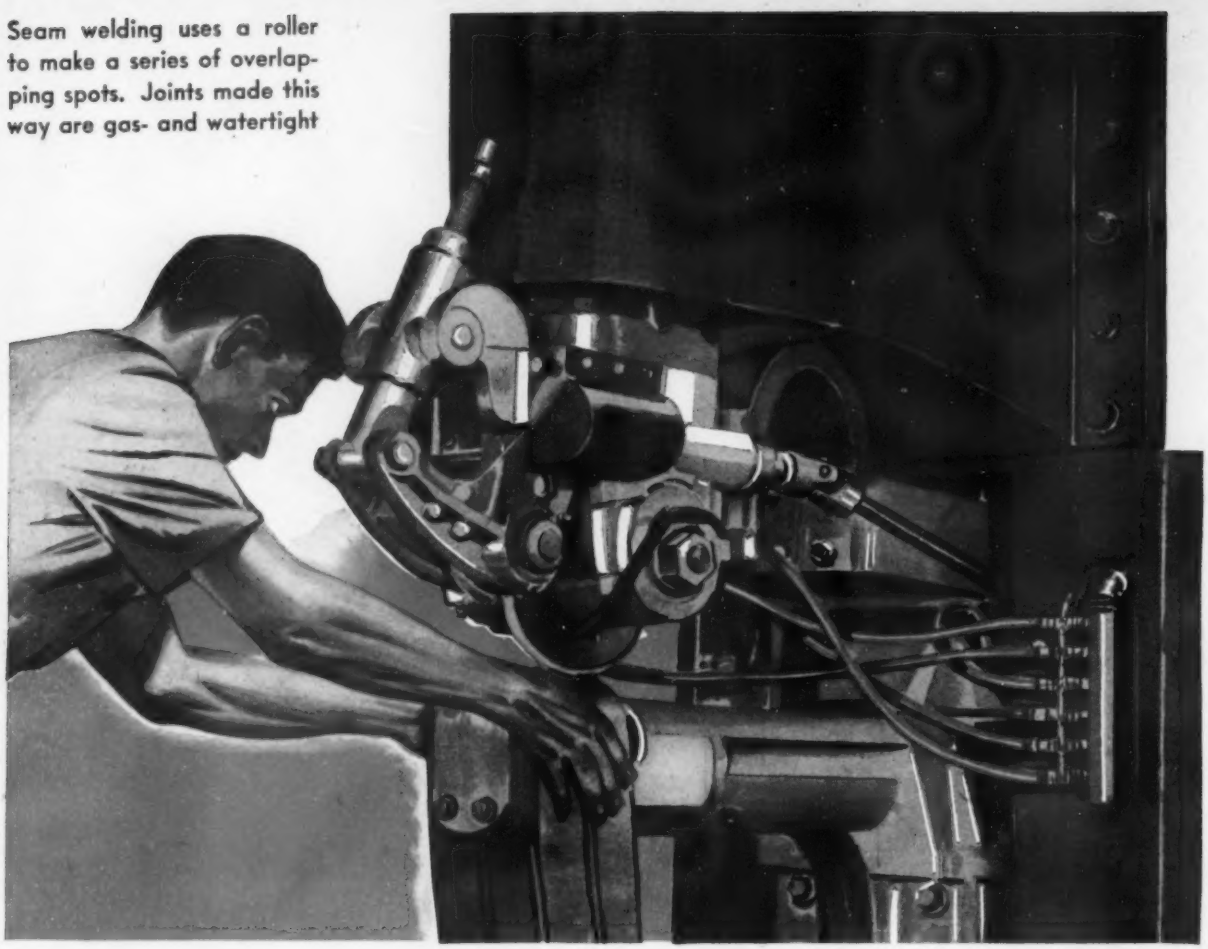


Motor-powered positioners swing large workpieces to the correct angle for downhand arc welding. Standard equipment of this type is available in a wide range of sizes

Versatility Characterizes Resistance Welding

Resistance welding is employed on a wide variety of equipment and in a great many adaptations. The principle is simple: two pieces of metal are pressed together while an electric current is passed through them. The resistance of the welded metal causes fusion at the point of contact, thus forming a weld without the addition of other metals. Some of the variations of the process go under such names as spot, butt, flash, seam, hydromatic, projection and gun welding. But while the equipment and end results of these methods differ considerably, they are merely mechanical variations of the same basic process.

The spot weld is the simplest form of resistance welding and consists of two electrodes forced together by rocker or piston action, while the current passes through them and any workpieces held between them. The main elements to consider, then, are pressure, time and heat, meaning the magnitude and duration



Seam welding uses a roller to make a series of overlapping spots. Joints made this way are gas- and watertight

of the current used. In the first crude form of the process, application of the three elements was often haphazard, but this has given way to an exact and highly controlled sequence which constitutes the welding cycle. The cycle consists of (1) squeeze, (2) weld current flow, (3) hold (pressure in the plastic state), and (4) off time.

The time cycle is in modern resistance welding frequently controlled by electronic means and is accurate from 1/60 of a second up to one minute. The time of current flow can be accurately synchronized with the welding pressure. On high production machines, hydraulic and pneumatic cylinders are becoming increasingly popular as a means of pressure application. Sources of friction between the piston and the cylinder, and in the packing gland around the piston rod, are prevented from influencing the pressure at the weld. Both rubber cushions and leaf springs have been employed for this purpose. Every effort has been made to secure uniform pressure by mounting the rams which carry the electrodes in ball bearing or other anti-friction mountings.

Regulators have been added to the electric circuit to offset the effect of voltage variation and the changed resistance of the welded parts on heating. In short, so far as is mechanically and electrically posible, the variables have been removed from the three prime elements of resistance welding: pressure, time and heat.

Evidence of the effectiveness of welding controls is found in the increased speed of spot welding. Before the war 75 spots a minute was considered good; now 200 spots are commonly made with single points and better than 500 with roller electrodes.

An outstanding development in spot welding has been the application of the stored energy system. This innovation has made it possible to weld aluminum and other non-ferrous metals that could not be handled previously at all.

Aluminum takes a higher welding current than steel, which made enormous drains on the power lines until the storage method was developed. This process, as its name indicates, takes the energy from the line over a period of time and discharges it in a sudden surge to give the desired fusion. Aircraft skins and many other aircraft parts are now fabricated by this method. One type stores the energy in a bank of capacitators through a three-phase rectifier. Another type stores the energy magnetically in a special transformer or reactor again using a rectifier.

Still another way of getting stored energy into welding units is through the use of storage batteries. Such equipment may be used where power line capacities are not available for the high demands of

conventional welders. The controls are simple and thus give advantages in out-of-the-way locations where electronic equipment may be difficult to maintain. This development rests largely on the improvement of storage batteries for military use during the war. A good export market is anticipated for this type of equipment because of its simplicity.

Another variation in welding control is the use of a thermocouple in the electrode so that the welding heat itself controls the cycle. This type of electrode is frequently used on heavy work, known as forge welding, to replace the automatic cycle prearranged on a time interval without regard to variations in thickness or composition of the material. In the temperature control system, electrodes are less likely to overheat and thus their life is prolonged.

Electrodes Are Water Cooled or Refrigerated

Hand in hand with the devolopment of resistance welding has gone the improvement of electrodes. More durable materials have been found, and these are now commonly water-cooled in order to keep temperatures from becoming excessive. High heat will naturally soften the electrodes and cause them to flatten or to pick up material from the member being welded. In this case, frequent cleaning must be resorted to.

A further step is the use of refrigerated electrodes which are said in some instance to double the number of spots made between cleanings. The coolant for such electrodes is set at temperatures from 10 F. below zero to 10 F. above zero.

Another electrode-saving device is the use of rollers instead of pointed contacts. Two rollers may be used, or one roller and a bar. The rollers may drive the work, or the work may be fed through them by external means. Current is interrupted in making roller-spot welds so that the metal may chill under pressure.

A useful variation of this method, called seam welding, overlaps the spots to form a continuous joint. Welds made in this fashion are watertight and gastight; hence they are frequently used on such products as gasoline tanks, refrigerator evaporators and condensers, paint and varnish containers, oil switches, transformers, vacuum bottles and metal vacuum tubes.

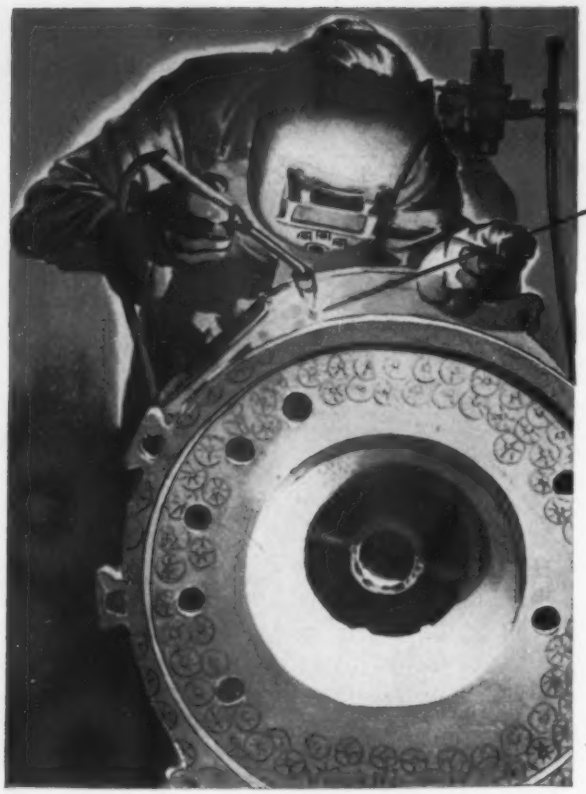
Seam and roller-spot welding is faster than spot welding using pointed electrodes, and because of its advantages is increasing in popularity. The rollers can be water-cooled or refrigerated as are the pointed electrodes. In fact, seam welds are usually made under water to prevent excessive heating of the work or the wheels. Another advantage of the process is that the rollers may be used in multiple. On one product four parallel wheels are arranged to make 2400 welds a minute.

On high-production jobs, multiple-spot welding has intriguing possibilities. One method has been to nest the parts to be welded in a jig. Electrodes are built into the jig to contact the workpieces at the proper points. This method has proved valuable within the limits of electric feeder line capacity. If many spots are made simultaneously, both the feeder lines and control equipment get to unwieldy sizes. The power factor suffers and in most communities where power is purchased, a heavy standby charge is made against such installations.

This condition has led to the developmont of equipment for welding spots in rapid succession. Usually two, four or more spots are welded at a time, but the equipment may provide for hundreds of spots in a single assembly. A typical set-up of this kind is used on an automobile steel underbody. Three machines are installed in a line, and together they form over 1200 spots, doing the work of 40 standard spot welders. Each unit or "gun," as it is called, is operated hydraulically from which the process gets its name "hydromatic."

Portable welding guns for making single spots provide a high degree of flexibility. They can be taken to the work in almost any position and are

Electronic tubes have been put to work for precise control on resistance welding circuits. Operation is as simple as tuning a radio



A shield of inert gas is effective in welding light metals as exemplified in the repair of this magnesium casting through the use of helium

frequently used to reach inaccessible spots to supplement the work of hydromatic machines.

The two main classifications of guns are the pinch type and the push type. As the name implies, the pinch type provides two electrodes which squeeze together to form the weld. For the push type, the workpieces are backed up by copper strips usually built into the work-holding fixture to form the second electrode. These guns are arranged so the firing cycle occurs automatically when the operator applies sufficient pressure.

Growing in popularity is the method known as projection welding. The workpieces are formed with embossed bumps, usually by dimpling from the opposite side in forming dies. These projections make contact points between the workpieces. Hence it is not necessary to use pointed or roller electrodes; flat electrodes or ones conforming to the general contour of the workpieces can be used, making electrode maintenance much lower. The shape, size and number of projections varies with each particular job, but in general the weld should start with a point of contact that increases in cross section as the fusion progresses. Press welders are used and may be cam, air or hydraulically operated. A variation of the process uses an annular line contact to weld pipe or tubing.

Butt welding consists in holding the workpieces on movable platens driven by a cam, hydraulic pressure or by the use of a spring. As the current is applied, the platens move together and the work softens to give the final upset to the weld.

In straight butt welding the parts are in contact before current is applied. In flash-butt welding the current is turned on before the workpieces are in contact. This draws an arc which is maintained by bringing the parts closer together as the metal is burned away. When the welding temperature is reached, the workpieces are pushed together, and the current turned off.

This process provides the spectacular pyrotechnics commonly seen on automobile body fabrication in making large joints. It has the advantage of giving a very clean weld since the burning of the surfaces leaves virgin metal to form the weld.

With the use of larger sections of sheet steel in the manufacture of automobile bodies and the advent of the turret top, some of the long seams formerly flash-butt welded have been eliminated. However, the process is still used extensively in automobile construction on bodies, axles, wheels, frames and other parts.

Careful Inspection Insures Against Faulty Welds

The war years have witnessed great strides in the inspection of weld. Army and Navy authorities were naturally loath to accept the process unless meticulous means of inspection could be applied to it. Consequently, the X-ray was called into play, and welds were literally looked into to determine their soundness in the completed assembly.

Another method of weld inspection employs the lines of magnetic flux produced by an electric current passing through the workpiece. The surface of the metal is coated with a finely divided metallic powder which follows the lines of magnetic force and indicates any interruption in them that may be caused by flaws in the material. This method of inspection is extremely sensitive; experience has shown that it seldom overlooks a cause of failure in the weld but if the result is not correctly construed the inspector may condemn work that might prove serviceable.

The magnetic particles may be applied dry or suspended in a light oil. A variation of the wet process is to have the particles contain a fluorescent material which glows when used under ultraviolet

light. This method of inspection will uncover flaws difficult to see on rough or dark surfaces.

Another method which uses ultraviolet rays is available for magnesium, aluminum and austenitic stainless steels which are non-magnetic and on which the flux lines cannot be used as inspection media. The surface is coated with a fluorescent penetrant which enters minute surface cracks. The excess material is washed off, and when the piece is viewed under ultraviolet light, surface defects can be distinctly seen.

An older but still reliable test of welds is the 180-degree bend which is stringent enough to show up defective joints. This quick method is used to qualify welders and, of course, can only be applied to test pieces.

Air and gastight joints can be checked by means of hydraulic pressure or by explosion tests in which the pressure is suddenly applied by means of a detonated powder charge. These are not the only tests for welds but indicate the intense scrutiny to which the process is being subjected today.

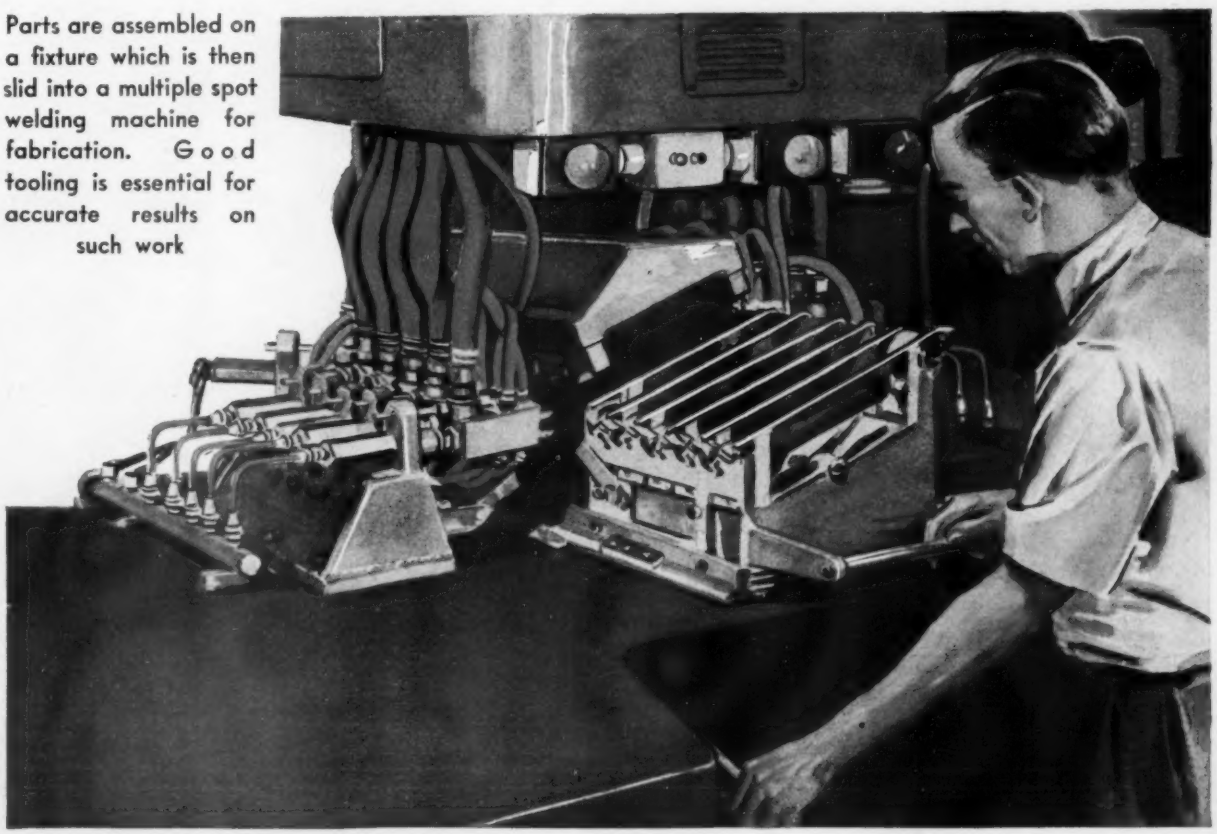
Designs Must Be Made With Welding in View

How will welding influence the products of tomorrow? It has won its place as a means of metal joining that deserves prime consideration when new products are designed. The marked improvements in technique have banished many of the bugaboos that formerly were associated with the process. But essential to its success is that design engineers and production men become welding minded.

Too often in the past, welding has been applied to products designed for some other method of fabrication. To use a simple instance, an I-beam must have flanges in order to use it in riveted construction. I-beams can also be welded, but perhaps the design would be stronger and simpler with tubular construction which lends itself to welding but not so well to riveting. In the aircraft industry, where production tooling was uninhibited by tradition, use of tubular fixtures became popular because of the speed with which they could be fabricated and the strength of the completed structure.

The same idea applies to product design. Many products can be made lighter, simpler and better looking as the welding process becomes part of their original conception.

As a means of manufacture, welding is literally ready to take its place in the production line. No longer is it necessary to consider the process as something which must be hidden in a corner of the shop. The logical place for welding is in its natural position in the sequence of operations.



Parts are assembled on a fixture which is then slid into a multiple spot welding machine for fabrication. Good tooling is essential for accurate results on such work

Welds hold no secrets from this 220,000-volt portable X-ray machine used here to diagnose a seam

For automatic welding, machines will more and more take on the precision and sturdiness of machine tools. They already use hard wearing surfaces, continuous lubrication, anti-friction bearings and other design details that the machine tool industry has found advantageous. This trend will continue until the welding machine achieves a degree of accuracy comparable to the machine tool. As a matter of fact, on certain aircraft parts, limits in welding have been held to a thousandth of an inch.

Other operations have been combined with welding in the same equipment. In making tubing from flat stock, for instance, forming and welding are carried on continuously, with the steel strip being fed into one end of the machine and the completed tubing coming out the other. Another example is the manufacture of small electrical parts in a turret-type machine where forming and welding are done in consecutive steps. Such instances lead to the natural conclusion that more combinations will be found in the future. However, it should not be inferred that it is desirable to do a lot of sheet-metal forming in ordinary welding equipment. Under most conditions, press operations on the several parts going into welded assemblies can best be done independently.

It is possible, however, to add a heat-treating phase to the welding cycle. This has been done, particularly on armor plate. After the weld is completed, current is again passed through the joint to refine the high alloy air-hardening steel. Tempering or short anneals may also be given the material in this way thus relieving stresses without the necessity for a separate operation.

There is still much to be learned concerning the design of welding jigs. Often this work has been undertaken by toolmakers whose chief experience lay in machine work. Welding has its own demands and peculiarities which should be fully considered in all tooling built for the process.

Manufacturers of welding equipment can make a contribution in this direction. Some have already started to market welding as a process and not as standard units of equipment. More and more they will be called upon to analyze the user's product and to make thorough-going recommendations as to the most efficient methods and tools.

Equipment arranged to operate as simply as turning a radio will make it possible to use semi-skilled workers. Thus, with the vagaries of manual control diminished, sound welds can be guaranteed, and the process will gain still greater acceptance.

Non-Metallic Fixtures Conserve Energy in Induction Heating

BY FRANK W. CURTIS, CONSULTING ENGINEER, INDUCTION HEATING CORPORATION

Alone, or in combination with metal parts, asbestos board can be used to make economical work holding fixtures for all types of induction heating for joining and localized hardening

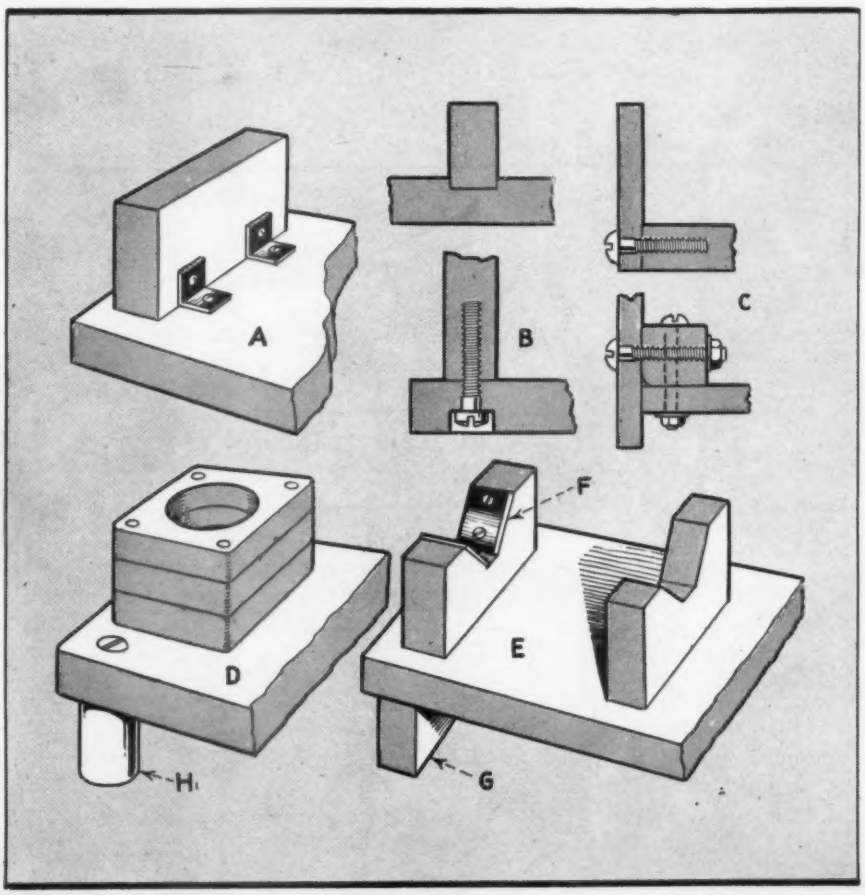
WORK-HOLDING FIXTURES used in high-frequency induction heating operations are similar to other fixtures in principle, but have one big difference, in that non-metallic materials must be substituted, as far as possible, for the usual metal components. This is especially true in the region of the induction heating coil. It has been found that asbestos board, such as Transite, is one of the most suitable materials from which to fabricate such fixtures.

If metal parts of a fixture lie close enough to the heating coil they absorb some of the flux energy that should be concentrated in the work. During repeated heating cycles, the temperature rise of nearby metal parts will reach an objectionable point. With non-metallic fixtures the only means of heating is by conduction, which is usually rather limited.

Asbestos board can be used in a wide variety of holding devices, either for use in the entire design, or in combination with other materials. Compared with metal parts, the cost is exceptionally low and it also has the advantage of being easier to fabricate. This material is comparatively hard and resists wear sufficiently well to make its use practical on locating surfaces for metal parts in induction heat-treating.

Transite can be obtained in sheets varying in thickness from $\frac{1}{8}$ to 2 in., with the most popular thicknesses for fixture design being $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 in. Its machining qualities are good, although it is abrasive and may dull delicate tools. Usually a metal bandsaw, a drill press and a disk sander will effectively handle most operations required to cut and form fixture parts. With this equipment, ordinary fixtures can be made in very little time. Parts that become worn can be replaced with little expense.

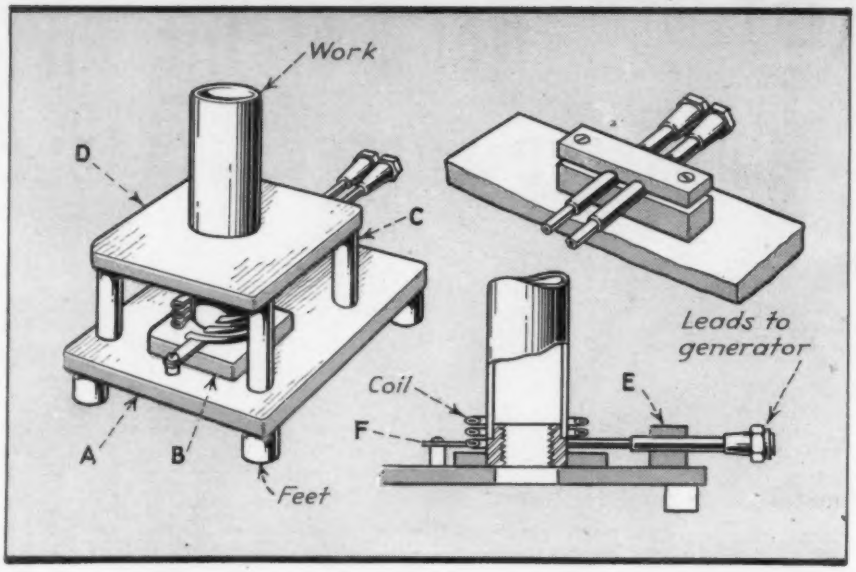
Sliding and rotating fixtures are relatively easy to build and do not involve much cost. Designs can usually be made in sketch form, whereas the actual building closely follows woodworking practice. There is little wear in such fixtures, and many thousands



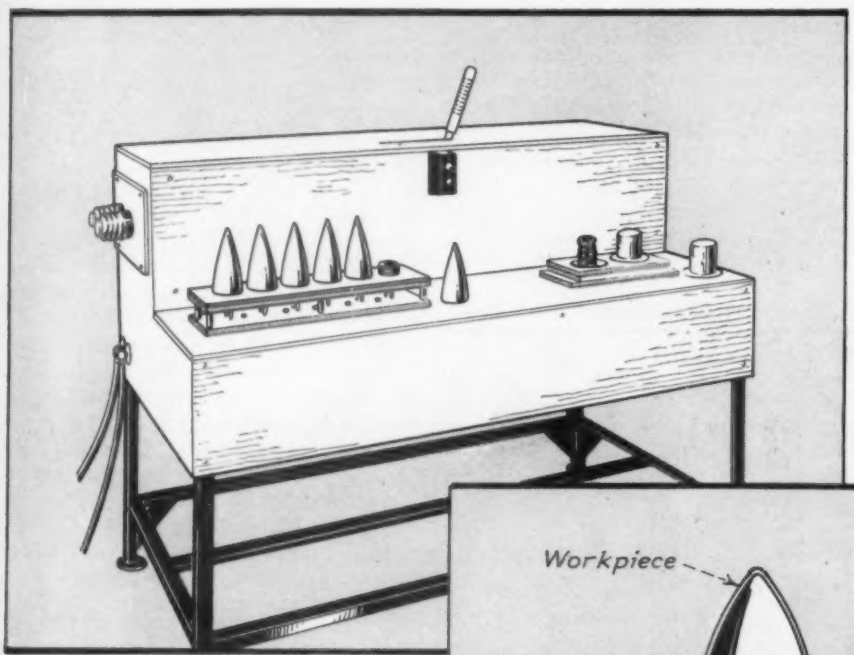
Non-metallic fixtures may be fabricated in several ways. Small metal angle plates, as at *A*, are used, but should be of non-magnetic materials such as brass or aluminum, because of low heat absorption. Screws and bolts can be used as in *B* and *C*. Lengths of screws should be, roughly, four to five times their diameters. When several layers are to be joined, the method shown at *D* can be used. This is a locating block for a cylindrical part. *E* is a complete V-block assembly for supporting round shafts. Angular surfaces, *F*, can be faced with brass plates for wear resistance. Supporting feet for fixture bases can be of asbestos board, *G*, or short lengths of plastic rod as shown at *H*.

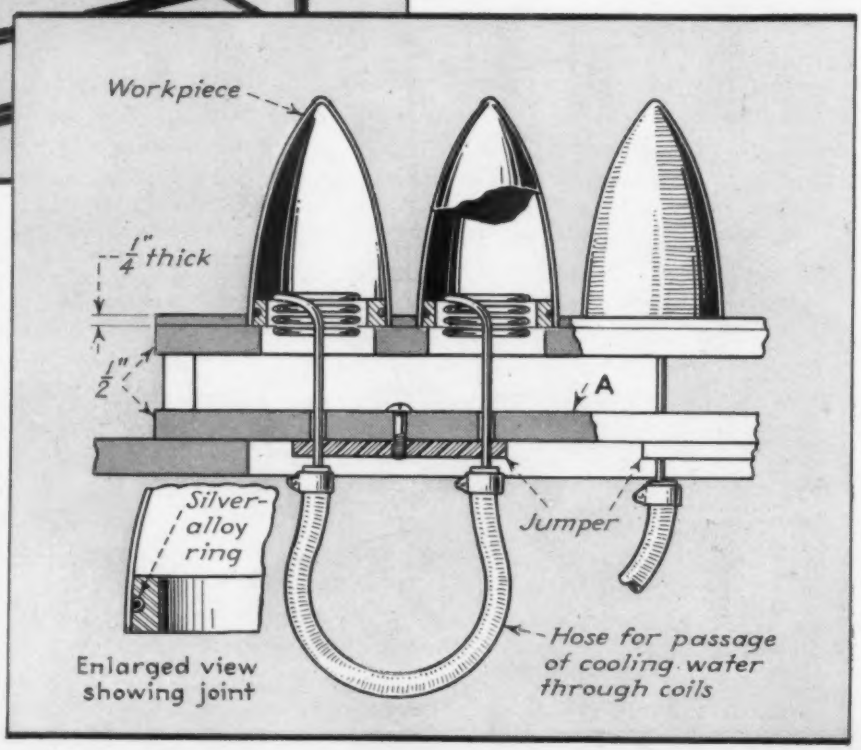
of pieces could be treated before any replacement parts would be needed. To prevent oil from soaking into the asbestos material, where oil is used for quenching, the entire fixture should be painted, or given two or three coats of shellac and this practice could well be followed in the case of all fixtures made of asbestos.

The application of asbestos board as used in the various fixtures described here are representative of the wide use of the material in connection with induction heating, either for brazing and joining metal parts, or localized hardening operations. With very little equipment, it affords the building of low cost fixtures for either limited or large production needs.



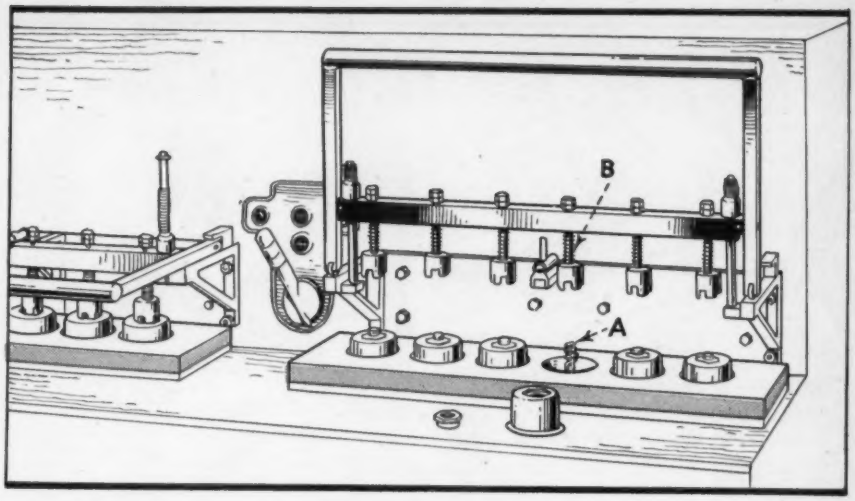
This fixture for induction heating is used for silver brazing a steel tube and collar. Base *A* has four feet, locating nest *B* and uprights *C* to support work aligning plate *D*. Also mounted on the base is the support for coil leads *E*, details of which are shown upper right. A small copper strip *F* attached to the lower turn of the heating coil is supported from the base by asbeetos board. This is permissible, as asbestos is an insulating material.

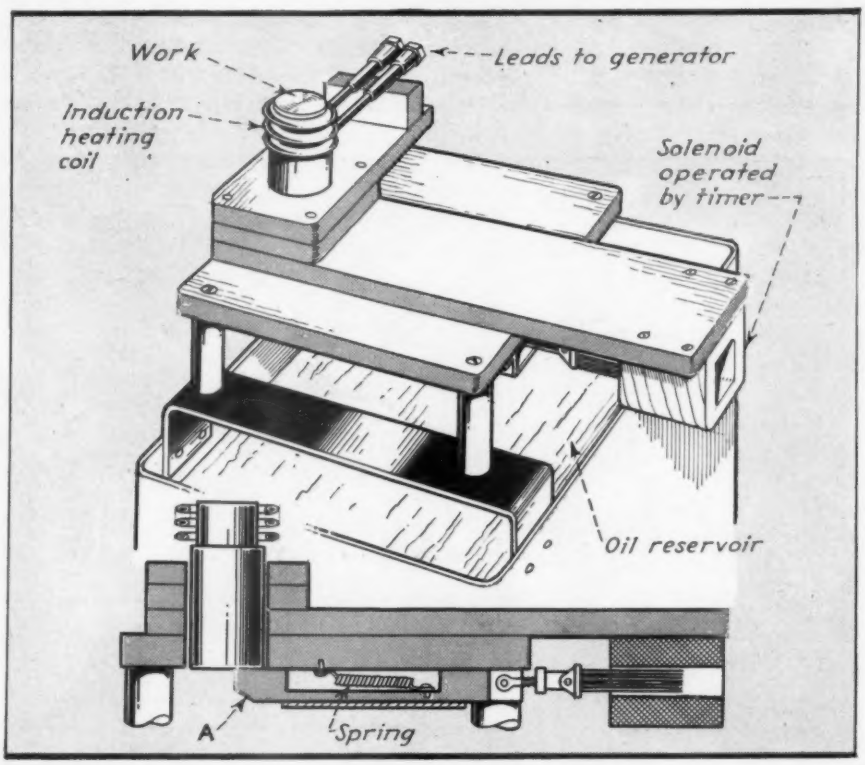




Two other multiple holding fixtures using locating plates of asbestos board are shown here. That above right is used to anneal a drawn steel shell, between draws. Two pieces are positioned over multi-turn coils, one of which is shown. Alignment is by means of bored holes in the upper plate. A smaller bore in the thin bottom plate provides location for the shell. Fixture at the left is used for brazing six assemblies, each comprised of a drawn shell and internal collar. Details are shown at the right. Asbestos strips, mounted together, centralize and locate the assemblies, while the lower plate *A* is used to support the internal-type coil assemblies, including jumpers and hose for cooling purposes.

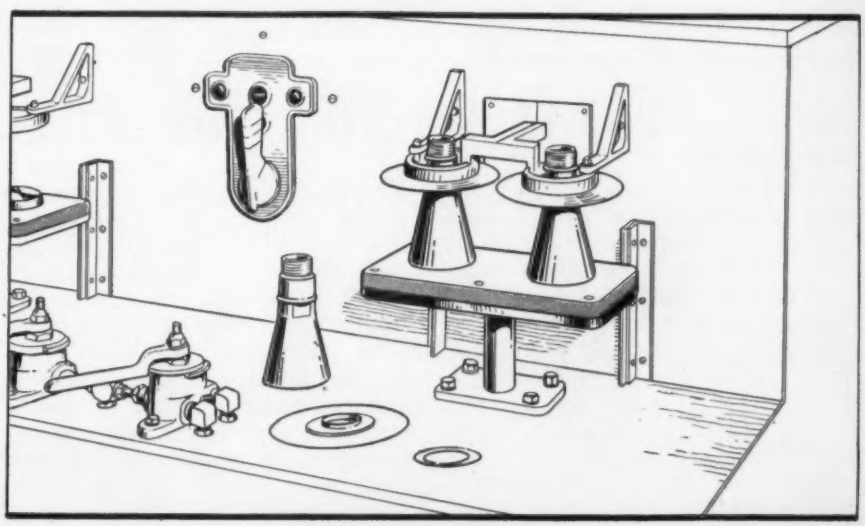
In this fixture, used for brazing a screw machine insert into a steel shelf, asbestos board is used to locate and align assemblies, six of which are accommodated in each fixture. The thicker section of material is bored to clear the outside diameter of a flange on the part. The thin section below has smaller holes to form locating surfaces. Coils used for this operation are of the internal type, *A*, and are series connected beneath the table top. Overhead spring plungers, *B*, shown in place in the left set-up, hold the inserts firmly against the shell face, so a firmly brazed joint results when the silver alloy washer reaches melting temperature.

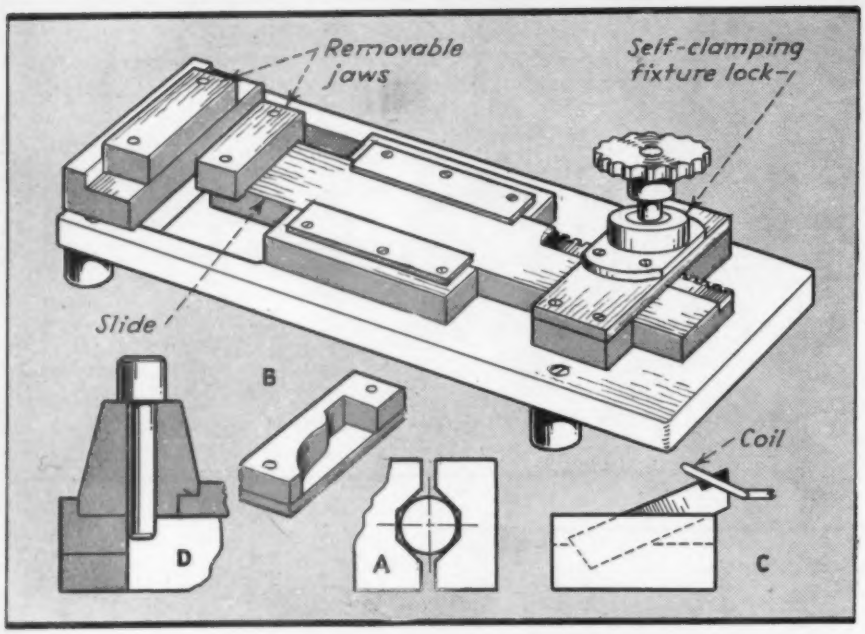




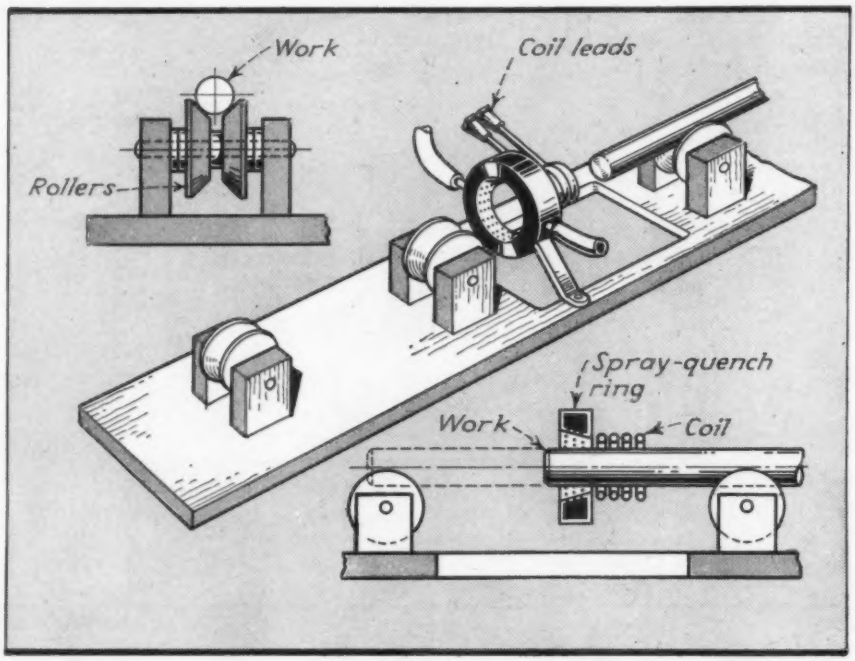
Fixtures incorporating rotating and sliding parts can also be constructed almost entirely of asbestos. Shown here is a fixture arranged for hardening the end of a small shaft which requires oil quenching. The fixture is mounted over an oil reservoir into which the heated shafts are dropped automatically. The shaft is inserted in the fixture through a multi-turn coil, where it obtains support from the sliding latch *A*. This latch is operated by a solenoid and has a spring return. The heating cycles and operation of the solenoid are controlled by a sequence timer, so precise repetition is possible.

This induction brazing set-up includes an air-operated fixture of the elevating type which raises two metal assemblies into a solid-type inductor coil. Asbestos is used for the table top, the front panel and the work locating plate. A set of parts, together with the silver alloy rings used to join them are shown to the left and in front of the fixture. The coil, which is a series design arranged to heat both assemblies at once, is supported by brackets attached to the asbestos panel board. It is obvious that through the generous use of asbestos in this installation there is little chance of the energy from the heating coil going anywhere but to the work itself. This is of considerable importance in work of the type shown.





Asbestos here offers the solution as to how to make a non-metallic vise. The design shown is provided with removable jaws so that various types of parts can be held in relation to the heating coil. At *A*, are jaws for a round piece, while at *B* is a jaw made of two sections of asbestos board for holding an irregularly-shaped part. The jaws at *C* are arranged for tool brazing, and those at *D* are of the extended type for holding a stud. The asbestos slide is mounted and operates between asbestos board ways. The vise is actuated by a small rack and pinion through a self-locking fixture. Operation of the handknob moves the jaws to the work. Other means of moving the slide can be used, although the lock shown provides rapid adjustment. This lock is of metal construction, but no heat absorption occurs because of the distance from the field of the heating coil.



For progressive hardening of a shaft, this experimental fixture was built. It is almost entirely of asbestos, including the base, pillar blocks and rollers and permits work to be hand fed through the heating coil and a spray-quench ring. A section through the rollers is shown at the upper left. Spacers can be shifted so different sizes of shafts can be accommodated. By providing a motor drive to the rollers on each side of the coil, through a small chain, an automatic feed could be provided.

Production Control Boards in Each Department

FOR TWO CONSECUTIVE YEARS a certain manufacturer of portable tools has hit the twelve-months quota of several hundred thousand units right on the nose. Credit for this achievement is shared by many people, but perhaps the largest single factor is day-by-day knowledge of machine schedules by expeditors and shop foremen.

The master production control board shows machine loadings for 60 days ahead. In each department, a smaller board shows machine loadings for a shorter period. The department foreman and the set-up men keep their eyes on this board, which may show that a given machine will be required for say a two-hour run on one part and then must be shifted to another job that will last half a day. In the screw machine department alone, as many as twenty changes of setup are experienced daily, because most parts are made in comparatively small lots. Obviously, the departmental production control chart is especially valuable here in planning changes in setup.

Foremen are also encouraged to make frequent visits to the master machine-loading board in the production control department. This practice acquaints them with management's plans for a longer period ahead, and enables them to make more accurate forecasts of labor requirements in their respective jurisdictions. Such information has a definite value in maintaining worker morale.

The Economic Reconstruction of Europe

THE time is fast approaching when allied and enemy populations alike will demand a blueprint for the economic reconstruction of Europe. The peace plans following this World War will be written piecemeal, and by experts, at a series of continuing conferences, such as Hot Springs, Bretton Woods, Dumbarton Oaks and Quebec, each tracing a new pattern for negotiation and each dealing with a single, specific problem. In the drawing of these plans, the United States, as owner of more than half of the world's industrial capacity, controller of the only great credit reservoir, and possessor of the largest force of highly skilled technicians and management engineers, has heavy responsibilities which its industrial, financial, agricultural and labor leaders cannot evade.

☆ ☆ ☆

Just what is the problem which the world's business leaders must help solve in Europe?

The best safeguard of peace is economic opportunity—a good chance for all peoples to raise their standard of living by their own ingenuity, foresight and industry.

Frustrated and disappointed peoples, who view the future with misgiving rather than hope, breed fanatical demagogues who seek to divert nations from their ills and disappointments by promising military glory and conquests.

Consequently, an important step in building a secure and lasting peace is to open the doors of opportunity to the peoples of Europe.

The greatest obstacle to opportunity in Europe has been economic nationalism.

The economic tradition of the Continent always has been highly nationalistic. The national feeling generated by the first World War, and the political autonomy conferred upon many peoples by the peace treaties, led to a great growth of economic restrictions. This trend was accentuated by the depression and by the military plans of the Fascists and Nazis. Hitler had to show his people they could be fed even if a blockade was imposed again. The inevitable result of these influences was to carry self-sufficiency to tragic extremes.

Economic nationalism holds down the standard of living of Europe in two ways:

1. It prevents the rise in most European countries of low-cost mass production.
2. It operates against an efficient geographical division of labor, preventing nations from doing what each can do best.

Great machines require great markets. One great machine of which the United States has many and Europe few is the continuous strip steel mill. At the outbreak of the war we had twenty-eight such mills of various sizes, England but one, and Continental Europe one. A building containing one of these machines is more than a quarter of a mile long and the minimum cost of the mill is almost $25,000,000. Only the prospect of a mass market justifies production on this vast, but highly economic basis.

The wasteful geographical distribution of production is shown by the agricultural policies of Italy, France and Germany.

In the 1930's, when lard sold for less than 8¢ a lb. in the United States, it cost 32¢ a lb. in Germany. In Italy and Germany imports of wheat were banned and its production at home was heavily subsidized. By the middle of the 1930's, wheat sold for $1.55 a bushel in France, $1.97 in Czechoslovakia, $2.29 in Germany, and $2.47 in Italy. At the same time the United States and the other efficient world producers and exporters (Canada, Australia and Argentina) were *restricting* production and were unable to average more than about 75¢ a bushel for their wheat.

Economic unity in Europe must ultimately mean a freedom to trade not greatly different from what we have within the United States. Given economic unity and the large markets which go with it, efficient mass production will develop. With Europe receiving cheap supplies of such staple foods as wheat, pork, lard and dried fruits from overseas, European farmers can prosper by specializing in producing fresh foods—butter, cheese, eggs, fruits, vegetables.

Then European agriculture will be more prosperous producing its specialties, and our agriculture (and that of the other great efficient surplus-producing countries as well) will have greatly expanded markets for our staples.

With a cheaper food supply for Europe—yet one yielding a better price for our agriculture—European labor will live better. Labor now used uneconomically for agricultural production will be released for industry. With big machines and semi-automatic processes European labor can produce more steel, automobiles, furnaces, plumbing and electrical appliances to advance its standard of living in coming decades, as the United States has done in past decades.

A rising standard of living in Europe will bring

Europeans to view peace with optimism and hope. And world trade grows as confidence and prosperity widen.

☆ ☆ ☆

How would a Europe which possesses economic unity appear to us on this side of the Atlantic?

It would be a prosperous Europe that would have strength in its advancing industries, but as the single great agricultural deficit area of the world, it would be dependent upon overseas supplies for vital agricultural staples. This dependence upon overseas agricultural supplies would be greatest for industrial Germany. Some people believe that a strong Europe would be a threat to world peace. More important, however, is the fact that a strong and prosperous Europe would not be a frustrated Europe. It would have found a way to achieve a rising standard of living. Furthermore, a prosperous Europe would, economically, be a dependent Europe because, although the European industrial worker would use more and cheaper food, he would have it only as long as he maintained the peace.

A prosperous Europe would be of special advantage to American agriculture (if we do not keep on pricing ourselves out of the market) and of great advantage to American industry.

The British policy of buying agricultural staples from abroad, for example, made her, a nation of only 45,000,000, the purchaser, in 1937, of $250,000,000 of all kinds of agricultural products from the United States. In the same year the rest of Europe (exclusive of Russia), with a population of 325,000,000 purchased only $300,000,000 of our agricultural products. But with more sensible organization of its agriculture, Europe could be expected to buy more than one billion dollars of agricultural products from us.

By far the greatest market for an expanded European industry will be Europe itself.

For American industry, there will be growing markets in Europe as industry expands. Experience shows that the trade between different highly industrialized areas is large. This country's biggest export markets have been with its keenest competitors—Britain, Canada, Japan, France and Germany.

Before the war, Europe, with two and one-half times the population of the United States, had only one-sixth as many automobiles.

If Europe (exclusive of Britain and Russia) were to motorize proportionately, it would need 75,000,000 automobiles. With normal depreciation this would ultimately mean 10,000,000 cars to be produced annually to replace worn out cars.

If one still wonders about the immense number of things Europe might produce *for herself*, let him calculate the highway expenditures, the filling and repair station businesses that must be equipped and maintained; and the doubling of the steel production that would be required to make the automobiles themselves and to reinforce with steel even a moderate amount of additional concrete highways.

Another example is the electrification of Europe. With two and one-half times our population Europe's consumption of electrical energy would be 175 million electrical H.P., if the European worker were to have the advantage of as many H.P. as the American. Yet, just prior to the war, Europe's installed operating capacity was only about 40 per cent of this figure.

☆ ☆ ☆

What has been sketched for Europe is actually much more nearly a page from the economic history of the United States than it is mere prophecy about a desirable future for a Europe at peace. But how can it be achieved? And what is our part to be in helping to bring it about?

Economic unity can be provided for the sovereign states of Western Europe by the peace treaty or treaties adopted at the end of the war. The provisions for securing *economic unity* in Europe should specifically cover:

1. Substantial freedom for persons and enterprises to do business anywhere in Europe.
2. Reasonably free movement throughout Europe of persons for employment, recreation and education.
3. Greatly increased freedom of trade:
   a. Within Europe—through the application of a Europe-wide agreement reducing the tariffs among all European countries to a maximum of 10 or 15 per cent.
   b. With the rest of the world—through reduction of European tariffs on goods bought from overseas. This would call for generally lower levels on manufactured goods, and for the removal (after a reasonable period of progressive reduction) of tariffs on all agricultural foodstuffs and most industrial raw materials.
4. A special currency provision requiring as nearly as practicable complete currency stabilization for all countries of Western Europe among each other.
5. Creation of an agency (with adequate revenues) through which all Europe-wide business and other affairs affected by these agreements would be administered for a minimum period of twenty-five years.

This would permit the economic unity of Europe to be substantially achieved. During this period, assistance in administering the provisions would be given by officials of the United Nations.

Near the end of such a period arrangements could be made for a vote in the European countries on whether or not to continue the "unification provisions." If the vote were in the negative, the United Nations would have proper warning that additional safeguards would be necessary to prevent war.

The suggestions made in this statement aim at securing economic unification of Europe and thereby promoting the possibilities of permanent peace in Europe.

The realization of these possibilities throughout the postwar years requires a freely expressed public opinion in Europe to guide all who share the responsibility for bringing peace to Europe and to the world.

James H. McGraw, Jr.

President McGraw-Hill Publishing Company, Inc.

Aircraft Control Joints Reinforced by Swaging

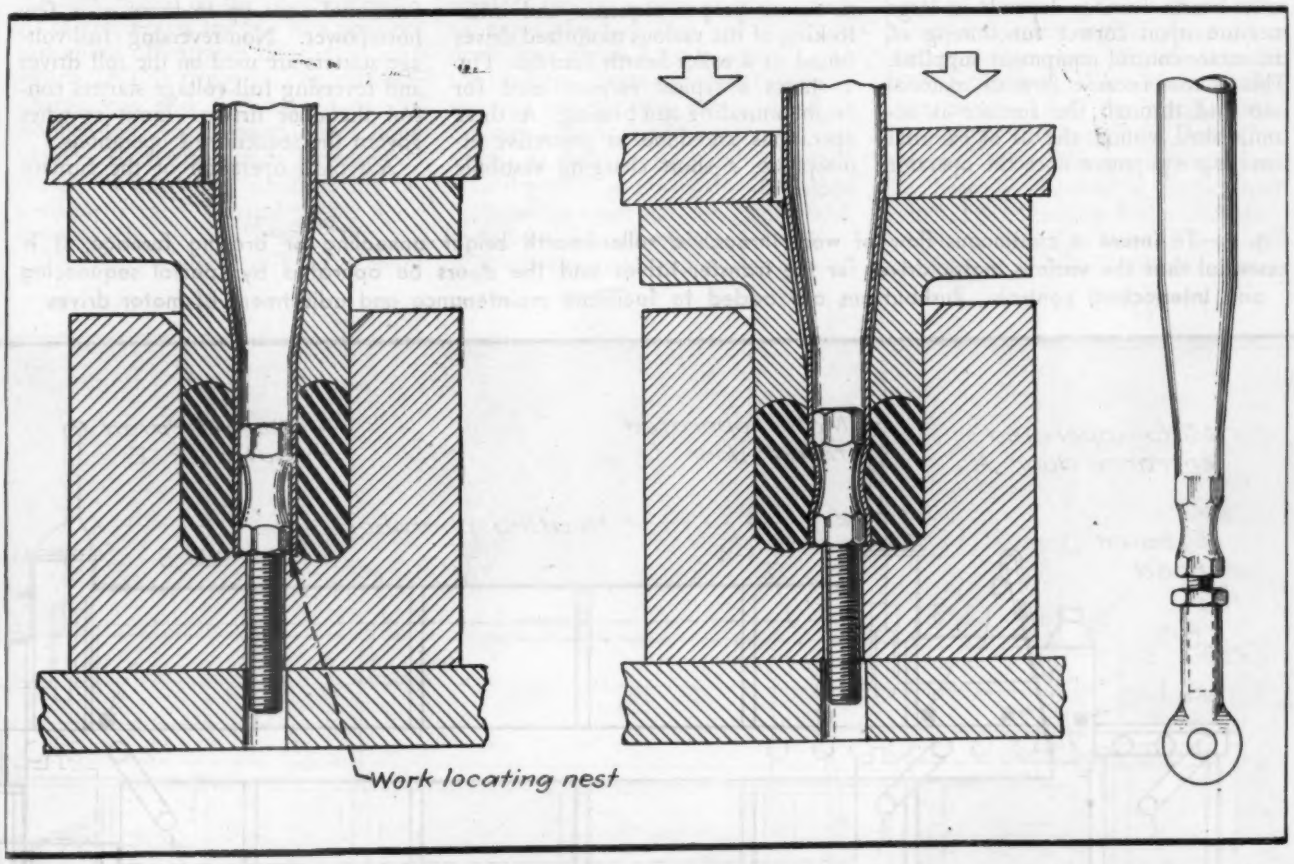
BY THOMAS A. DICKINSON, CONSOLIDATED VULTEE AIRCRAFT CORPORATION

A NEW METHOD of swaging push-rod tubing around end fittings or terminals has been developed which will enable the finished rod to handle comparatively heavy axial or torsional loads. This method, developed at Consolidated Vultee, makes it possible to indent, or swage, the tubing around a square, hexagon, knurled or otherwise roughened plug and greatly increases the strength of the engine and flying controls of large modern aircraft.

Prior to the development of swaging the terminals were secured to the rods by rivets or bolts, but this type of joint limited the strength of the assembly to that of the fastening device.

The tool used for swaging such parts consists of a die with a toroidally grooved surface at the bottom and a punch with a suitably groved face. When fitted together the die and punch can be placed in the yoke of a pneumatic squeezer, or in a press. The punch and die both have central openings and at the top of the opening in the die is a shallow cylindrical recess, concentric with the toroidally dished face of the die. A cylindrical rubber ring is interposed between the bottom of the die and the end of the punch. When pressure is applied to the punch it is forced into the die, compressing the rubber ring. The tube, in turn, is pressed firmly and uniformly against the outer surface of the plug, making a firm, rigid joint capable of withstanding heavy axial or torsional loads.

The purpose of the opposed toroidal grooves in the bottom of the die and face of the punch is to prevent the rubber from being extruded through the minute openings between the die, punch face and tube. They are provided, in fact, with hollow-ground edges, which spring slightly under pressure and closely seal all clearances against leakage of the rubber.



The rod terminal, or plug, is placed in the recess of the die, with the shank extending down through the hole. The rod, or tube to which it is to be joined is inserted from the top and pushed down far enough to be seated around the terminal. Pressure applied to the punch compresses the rubber and tube, as shown (center) and the two parts are firmly joined in a complete fitting

Magnetic Devices Control Speed of Roller-Hearth Furnaces

BY G. W. HEUMANN, INDUSTRIAL CONTROL ENGINEERING DIVISION, GENERAL ELECTRIC COMPANY

Automatic sequence controls and interlocking devices govern the passage of work trays through a heat-treating machine. Several ways of installing motor control are available, depending on the size of the furnace and space

SATISFACTORY PERFORMANCE of a roller-hearth furnace depends in large measure upon correct functioning of the motor-control equipment supplied. This is true because flow of material into and through the furnace is accomplished without the air of external handling equipment once the operator has set automatic-sequence controls for the heat-treating cycle desired. Under the circumstances, personnel responsible for installation of roller-hearth furnaces should investigate these matters:

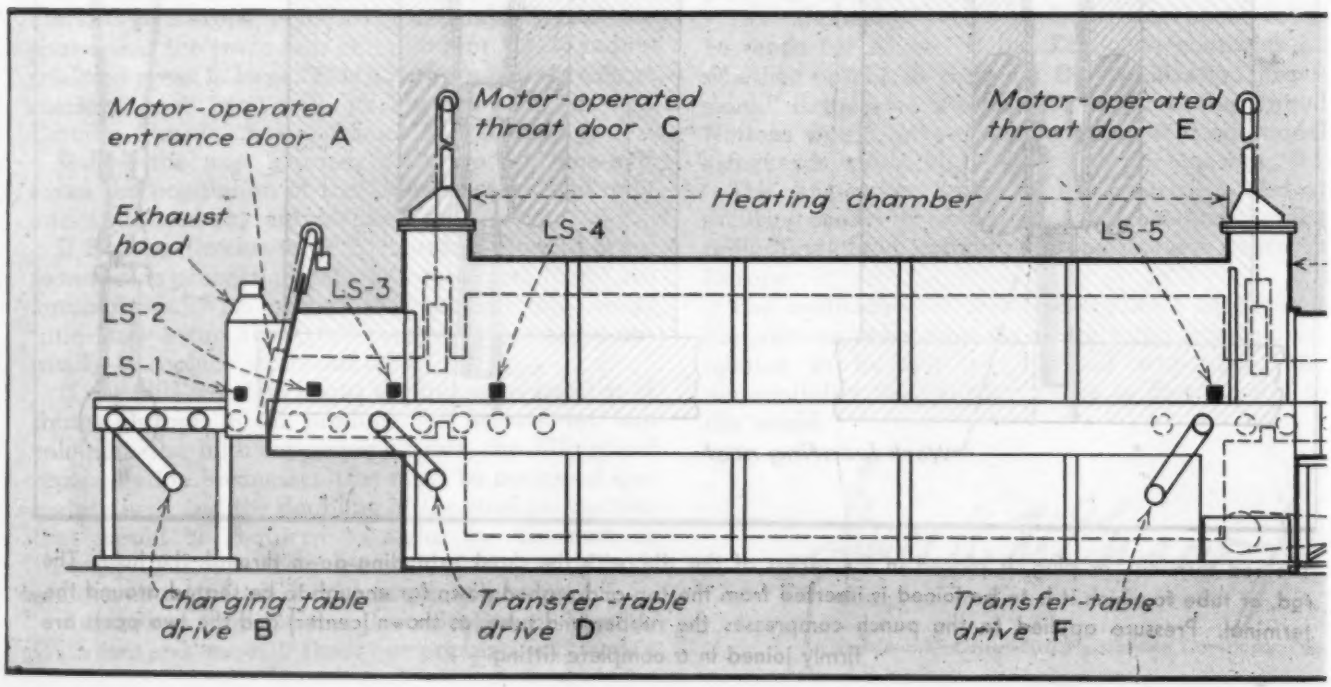
1. Will the control equipment provide the desired heating cycles?
2. Is the equipment conveniently arranged for the furnace operator and the maintenance crew?
3. Is the equipment safe for operating personnel?
4. What is the cost of the control, including installation and field wiring?

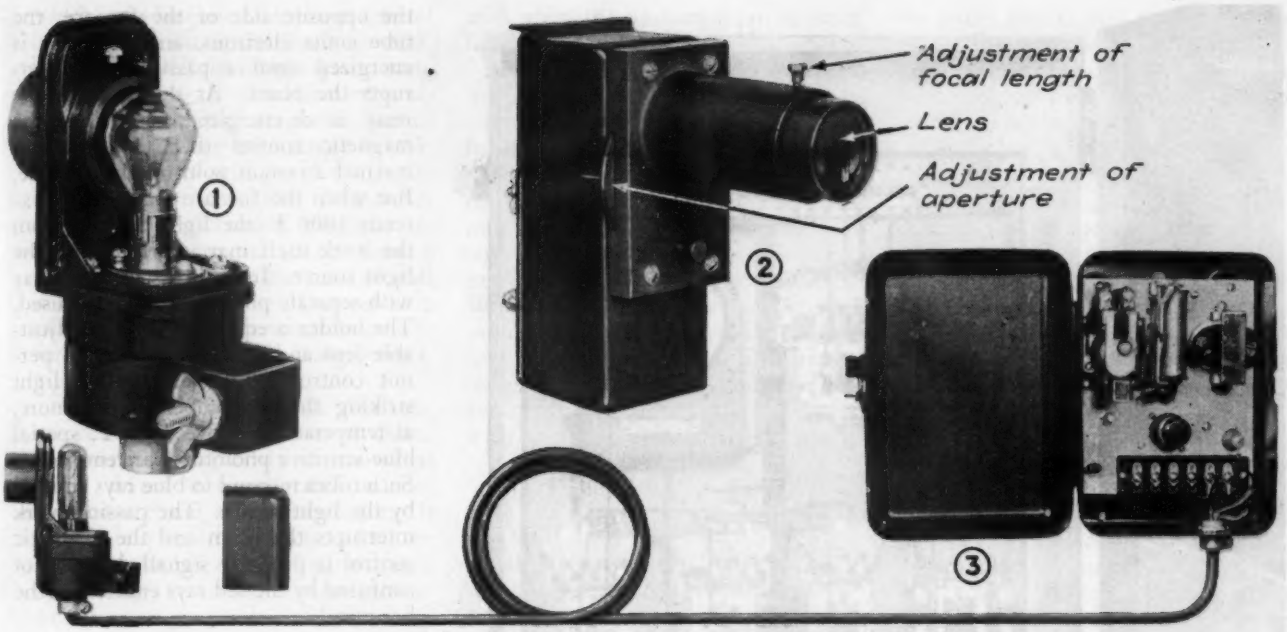
Special controls have been devised to assure proper sequence and interlocking of the various motorized drives found in a roller-hearth furnace. Fig. 1 shows a typical furnace used for bright annealing and brazing. As these operations are done in protective atmosphere, a short charging vestibule is provided at the entrance end of the heating chamber.

Motor-operated doors operate the heating and cooling chambers of this furnace and seal the furnace against ingress of air. A main drive motor turns the hearth rolls at constant speed, whereas other motors overdrive the charging, transfer and discharge rolls in order to effect quick transfer of work into and out of the furnace and between chambers. Speed control of the various motors is usually not required; hence, the majority of roller-hearth furnaces are equipped with squirrel-cage induction motors, ranging from fractional sizes up to those of a few horsepower. Non-reversing full-voltage starters are used on the roll drives and reversing full-voltage starters control the door drives. Limit switches govern the sequence of operations.

A typical operation of the furnace

Fig. 1—To insure a continuous flow of work through a roller-hearth bright annealing or brazing furnace, it is essential that the various motor drives for the transfer tables and the doors be operated by special sequencing and interlocking controls. Pushbuttons are added to facilitate maintenance and adjustment of motor drives



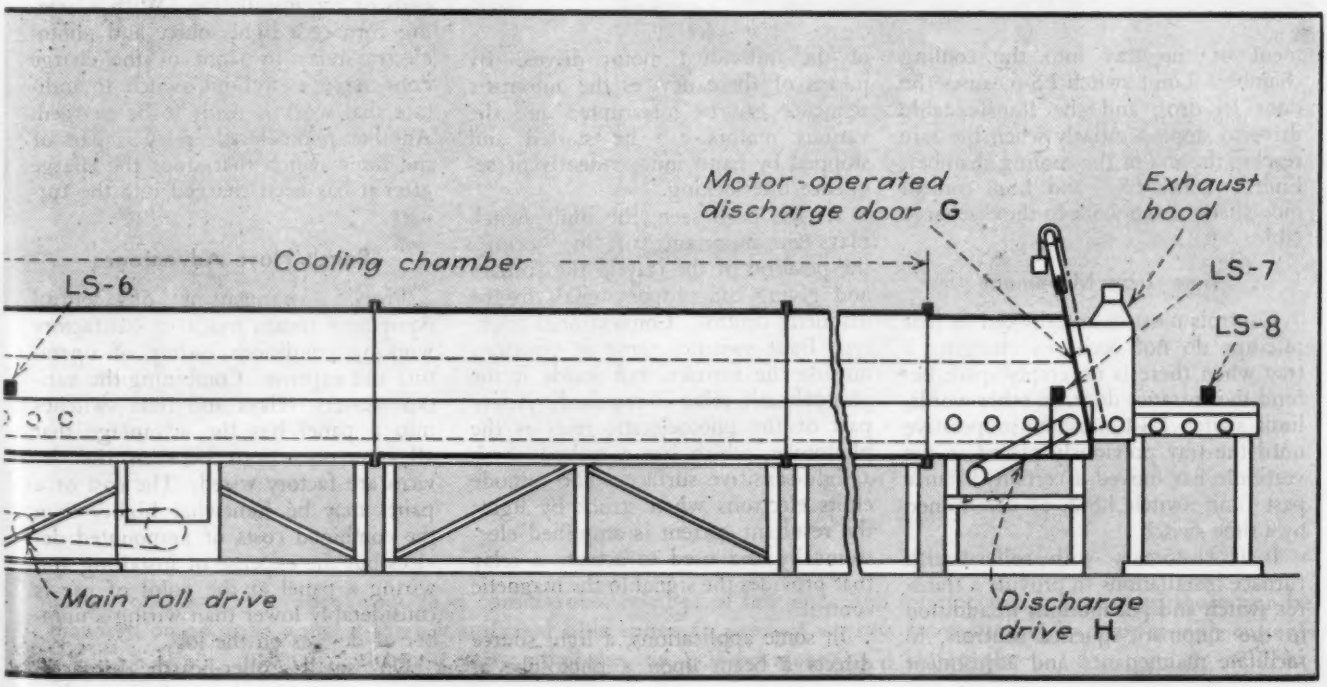


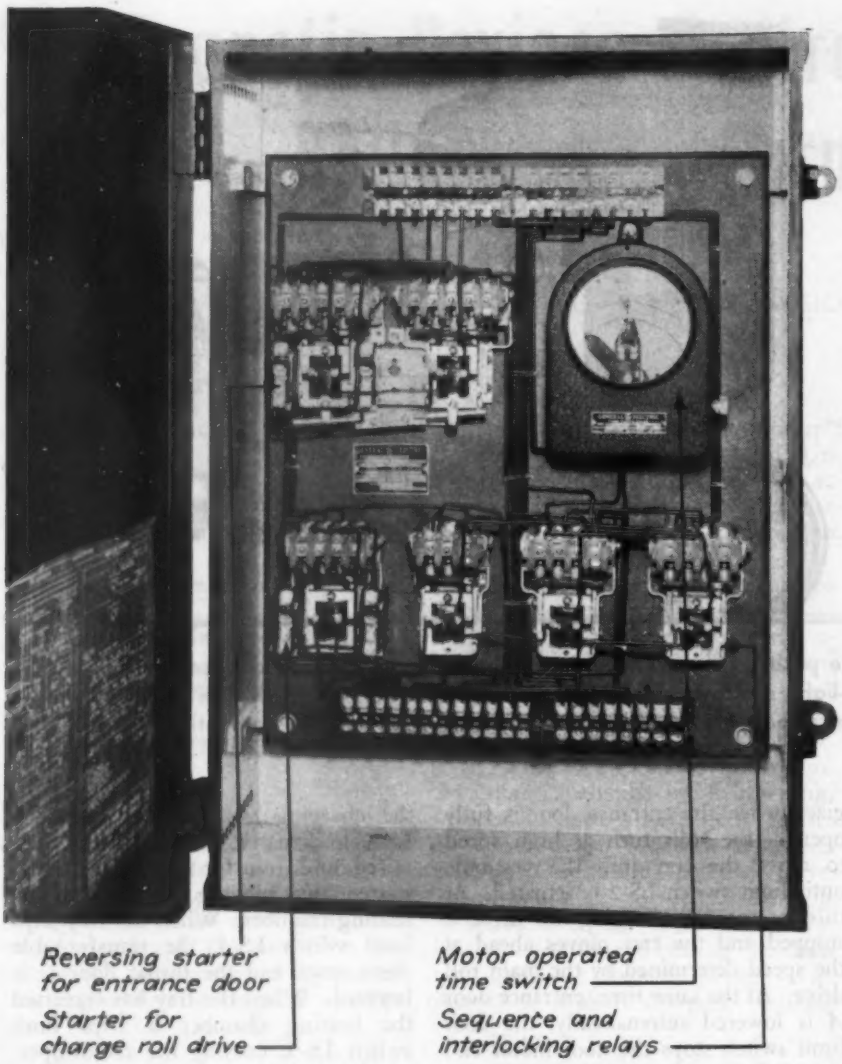
Photoelectric relays can "see" the position of work trays inside the furnace, are therefore used as limit switches. (1)—light source; (2)—light sensitive phototube and holder with optical system for high-temperature work; (3)—photoelectric relay with phototube holder for separate mounting

is as follows: Assume that a work tray has been placed on the charging table. As the rolls carry the tray to a position just ahead of entrance door *A*, a limit switch LS-1 is tripped. The entrance door opens and the door motor is stopped in the open position by a limit switch. If a gas curtain is required, the gas is turned on automatically by a magnetic valve actuated by the door limit switch.

The charging-table drive *B* is energized when the entrance door is fully opened, the rolls turn at high speed to move the tray into the vestibule until limit switch LS-2 is actuated. At this instant, the charging-roll drive is stopped and the tray moves ahead at the speed determined by the main roll drive. At the same time, entrance door *A* is lowered automatically, the door limit switch stops the door motor and shuts off the gas curtain.

When the tray reaches the rear of the charging vestibule, limit switch LS-3 is actuated. Throat door *C* is raised and transfer-table drive *D* is started, thus moving the tray into the heating chamber. When the tray trips limit switch LS-4, the transfer-table drive stops and the throat door *C* is lowered. When the tray has traversed the heating chamber it trips limit switch LS-5, causing the motor-operated throat door *E* to rise and the transfer-table drive *F* to accelerate move-




Reversing starter for entrance door
Starter for charge roll drive
Motor operated time switch
Sequence and interlocking relays

Magnetic control devices for small roller-hearth furnaces usually function best if assembled in a wall panel that can be mounted on or near the furnace

ment of the tray into the cooling chamber. Limit switch LS-6 causes the door to drop and the transfer-table drive to stop. Similarly when the tray reaches the end of the cooling chamber, limit switches LS-7 and LS-8 control movement of the work to the discharge table.

Time Tray Movement

Controls must be interlocked so that pile-ups do not occur by charging a tray when there is no empty space behind the entrance door. In other words, limit switch LS-1 must be inoperative until the tray previously placed in the vestibule has moved a certain distance past limit switch LS-2, as determined by a time switch.

It is customary with roller-hearth furnace installations to provide a transfer switch and pushbuttons in addition to the automatic-squence controls, to facilitate maintenance and adjustment of the individual motor drives. By means of these devices the automatic sequence can be interrupted and the various motors can be started and stopped by hand independently of sequence interlocking.

As has been seen, the limit switch plays an important part in "seeing" the position of the tray in the furnace and giving the proper signals to the magnetic control. Conventional track-type limit switches serve at positions outside the furnace, but inside it the photoelectric relay is required. Active part of the photoelectric relay is the phototube, which has a cathode with a light-sensitive surface. The cathode emits electrons when struck by light; the resultant current is amplified electronically and used to actuate a relay that provides the signal to the magnetic control.

In some applications, a light source directs a beam upon a phototube at the opposite side of the furnace, the tube emits electrons, and the relay is energized until a passing tray interrupts the beam. At this instant, the relay is de-energized, signalling the magnetic control that the tray has reached a certain point in the furnace. But when the furnace temperature exceeds 1900 F. the light emitted from the work itself may interfere with the light source. In such instances a relay with separate phototube holder is used. The holder is equipped with an adjustable lens and variable aperture to permit control of the amount of light striking the phototube. Furthermore, at temperatures above 1950 F. special blue-sensitive phototubes are employed. Such tubes respond to blue rays emitted by the light source. The passing work interrupts the beam and the magnetic control is properly signalled; it is not confused by the red rays emitted by the hot metal.

"Black Spot" Control

As an alternative, the light source is omitted in high-temperature furnaces and the signal is taken by red-sensitive phototubes directly from the heated work. In this arrangement the tube is trained on a "black spot" on the opposite furnace wall. When work passes in front of the tube, the light emitted causes the phototube to energize a relay; if there is no work at that portion of the furnace, the tube is not active because it receives no light from the black spot.

Photoelectric relays are not restricted to determining the position of work within a furnace. They will also serve in place of mechanically operated limit switches at the charging and discharge ends of the installation. With a brazing furnace a light source and photoelectric relay in front of the charge door serve as a limit switch to indicate that work is ready to be charged. Another photoelectric relay is part of the limit switch that stops the charge after it has been charged into the furnace.

Panels Have Advantages

Proper arrangement of control equipment means much in satisfactory working conditions, safety of operators and expense. Combining the various starters, relays and time switches into a panel has the advantage that all interconnections between the devices are factory wired. The cost of a panel may be somewhat higher than the combined costs of unmounted devices but the expense of installing and wiring a panel at the point of use is considerably lower than wiring a number of devices on the job.

On small roller-hearth furnaces,

which may require automatic control only at the charge and discharge end, with comparatively simple interlocking between drives, it is advisable to arrange the necessary magnetic control devices for either the charge or discharge end on a wall panel which can be mounted on or near the furnace. A typical panel contains a magnetic reversing starter for the charge door, a magnetic starter for the charge roll drive, three control and interlocking relays, and a motor-driven time switch, for time-sequencing the charges entering the furnace.

With large roller-hearth furnaces, consisting of a large number of chambers and using a variety of individual motor drives, a considerable amount of sequence and safety interlocking is usually required. In such cases, the use of a number of small panels, each controlling a certain drive section, would entail a considerable amount of cross-wiring at the installation, thus resulting in a high installation cost. Also, servicing a number of small panels is more difficult than servicing a control concentrated at one point. A better solution is obtained by combining all magnetic motor controls on a common panel, located centrally with respect to the furnace. This will result in somewhat large conduit runs to the individual motors, but this slight disadvantage is overweighed by the limitation of cross-wiring between several individual units and the greater ease with which the equipment can be maintained.

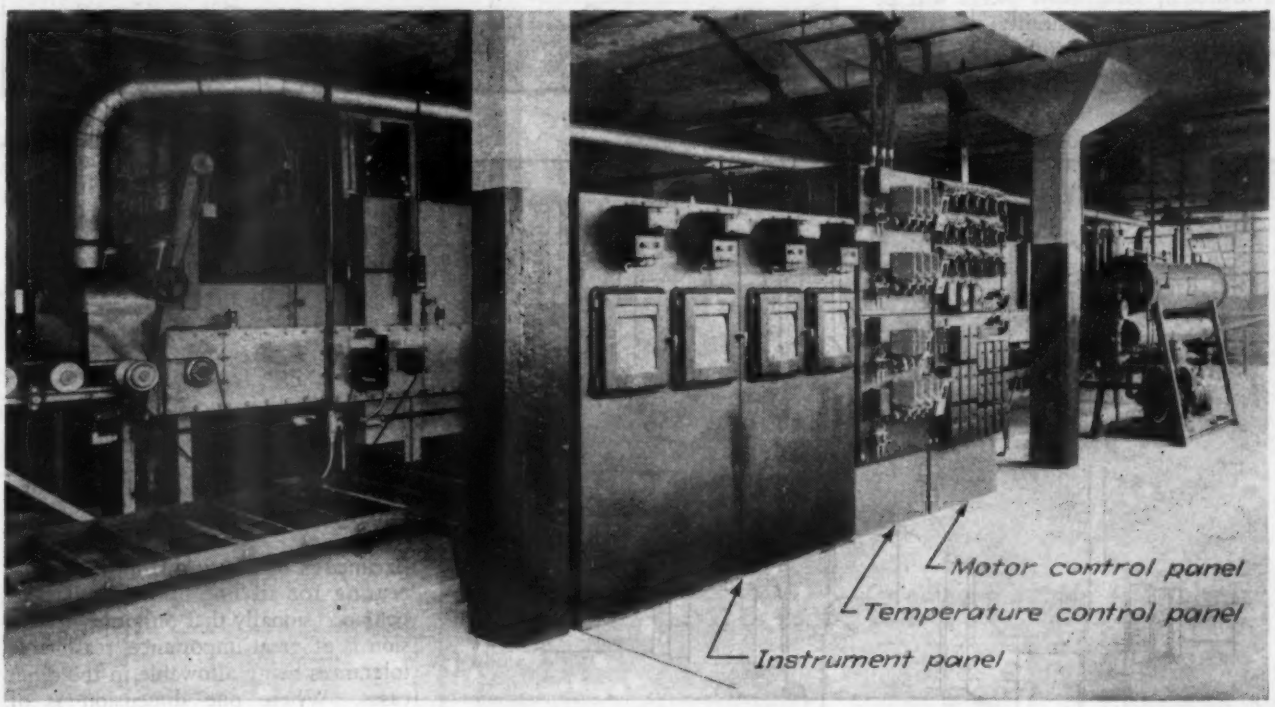
If ample space is available around the furnace, an open panel may be installed on the factory floor near the furnace. Temperature indicator, magnetic temperature control, and magnetic motor-control panels are placed in a row, thus forming a "nerve center" for the whole furnace, which is easy to supervise and to maintain. When deciding upon such a method of installing control, care should be taken to provide ample aisle space around the panel, in order to minimize the hazard of the operator coming in contact with exposed current-carrying parts.

Location of Panels

This hazard can be eliminated by installing the control in a compartment separated from the operating floor and accessible only through a door which can be locked. For example, the temperature and motor-control panels for two roller-hearth furnaces were installed in a sheet-steel housing above the furnaces. If sufficient space for a control compartment cannot be found, and if it is necessary to mount a control panel on a crowded factory floor, this panel should be inclosed in an individual sheet-metal case. A typical panel, suitable for mounting alongside the furnace, has front and rear doors which can be locked, thus permitting easy access to the panel devices and the wiring, but preventing accidental contact with live parts by floor personnel. At the same time, the control equipment is protected against accumulation of dirt.

Even though automatic cycle controls, when once set up, continue to function without assistance from the operators, it is necessary to provide means to operate each motor drive by hand independently of the cycle set-up. Hand control is required for maintenance and repair work, as well as for checking and adjusting the various motorized drives when the furnace is first placed in service.

On smaller furnaces, where only automatic charging and discharging is used, the pushbutton stations for individual motor operation can be mounted right on the furnace. If the furnace is large and the control complicated, a large number of pushbuttons on the furnace would be confusing to the operator. A better arrangement is obtained if the pushbuttons are consolidated on an operator's panel. In the case of a large furnace, operators' control panels are located at strategic points on building columns, each panel controlling a section of the furnace. In case the furnace is not too large, so that all parts of the furnace can be observed from one central location, a very desirable arrangement is obtained by consolidating all controls, which the operator has to manipulate, on one centrally located control stand.



Large roller-hearth furnaces require a considerable number of sequence and interlocking devices, and these can be mounted on an open panel if there is sufficient aisle space to prevent workers from coming in contact with current-carrying parts; otherwise, an inclosed mounting is indicated

Accurate Grinding Depends Upon Correct Location of Surfaces

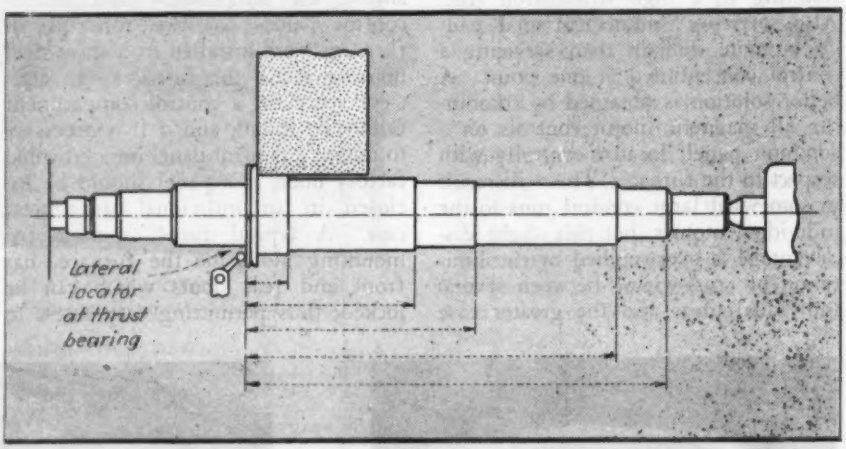
BY S. H. NEADY, ASSISTANT CHIEF ENGINEER, LANDIS TOOL COMPANY

Difficulty in securing correct lateral dimensions or correct relationship on ground parts is frequently due to incorrect use of multiple locating points

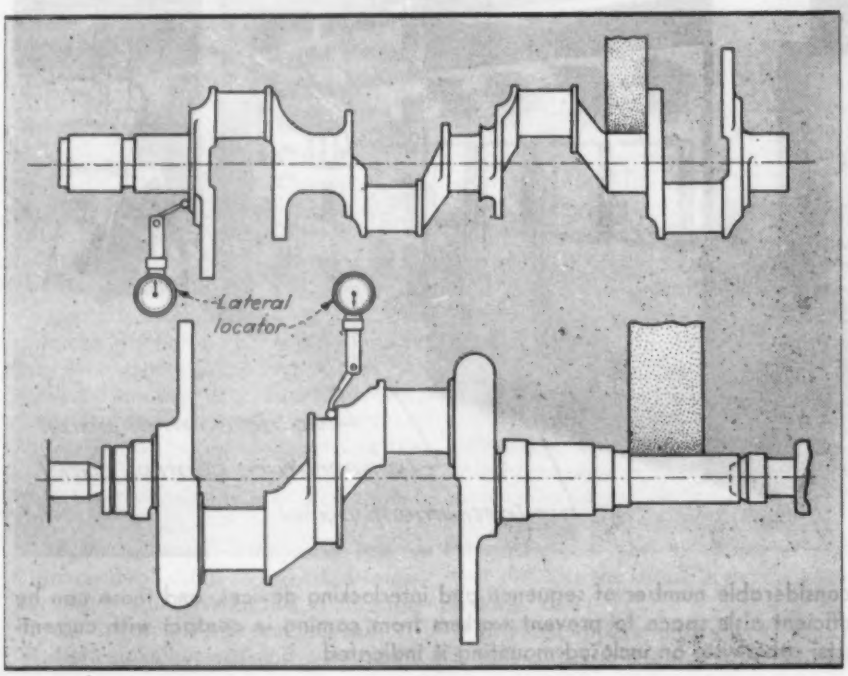
ACCURATE cylindrical grinding to insure correct angular relationship and complete interchangeability of parts can be achieved only if correct methods of locating are used. All surfaces to be ground should be located from a single point, from a point which will have a definite relation to another point in the assembly, or from a point as close as possible to the surface that is to be located. Without accurate locating of the surfaces to be ground, anything approaching complete interchangeability of parts will be purely a matter of luck, many pieces will be spoiled beyond possibility of salvage and production will suffer.

Some shop men may find it hard to believe that there are shops in which the elements of locating are not fully understood. It frequently happens, however, that cylindrical grinding problems are due to such mistakes as "locating" from point to point, or using more than one locating point. The resulting errors may be cumulative, or they may offset each other to some extent. Either way it is unlikely that the part will fit into the assembly.

That the basic principles of correct lateral locating on cylindrical parts to be ground are not commonly understood by shop men generally is evidenced by the fact that inquiries are received frequently from both large and small shops as to the best method



In the case of a machine tool spindle all surfaces to be ground should be located from a single point which has definite relation to other points in the assembly, namely, the thrust bearing, which is usually the best locating point in any grinding operation



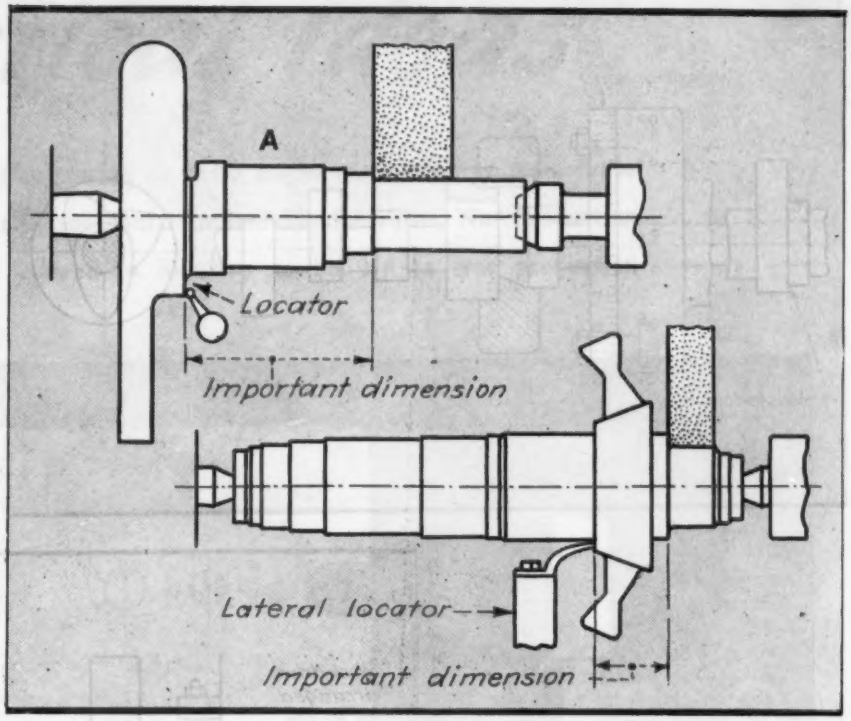
★

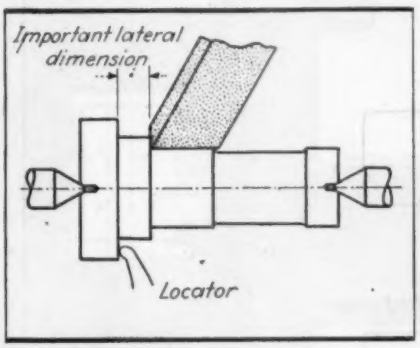
Examples of locating from the thrust bearing for all line bearings. It happens occasionally that only one dimension is of great importance, reasonable tolerances being allowable in the other cases. Where one dimension is of supreme importance, a locating point as close as possible to the part should be selected, preferably one of its boundary surfaces

for locating surfaces to be ground, which in many cases are on parts already in production.

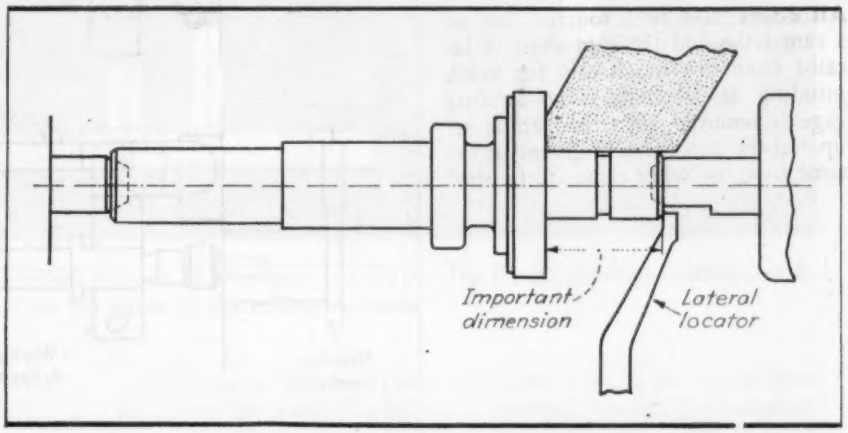
Locating surfaces from more than one point, which is the course quite frequently followed in many shops, is to assume that the lateral dimensions on the turned part are all correct, which is a reasonable assumption only when a part has been turned on a multicut lathe.

These two parts are of a type which must have one particular dimension held closely. The part indicated as *A* is an exception to the usual rule of selecting a point as close as possible to the ground surface, as the intermediate dimensions are not very important

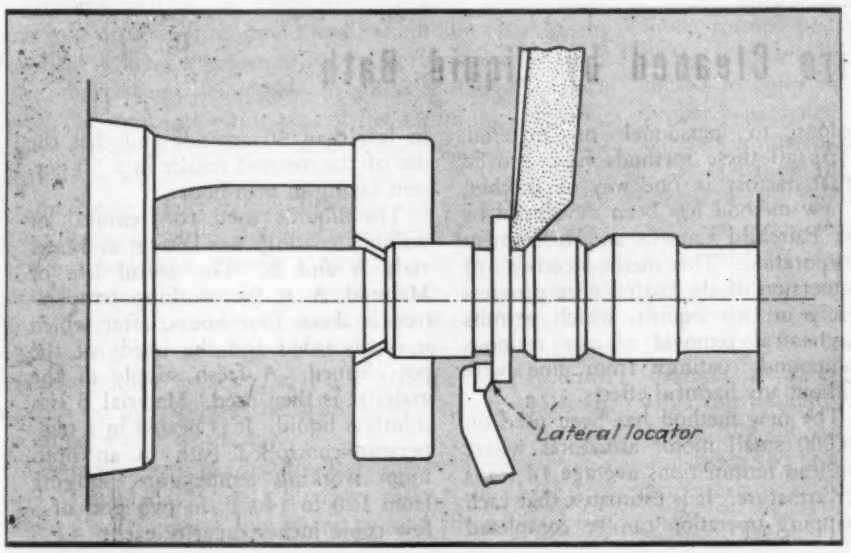




The point that would naturally be selected for locating would be the outside of the largest diameter flange, as the width of the next diameter must be held to very close limits and center holes should not be dependent upon, as any errors arising through their use as locating points would seriously affect the accuracy of grinding jobs of this character

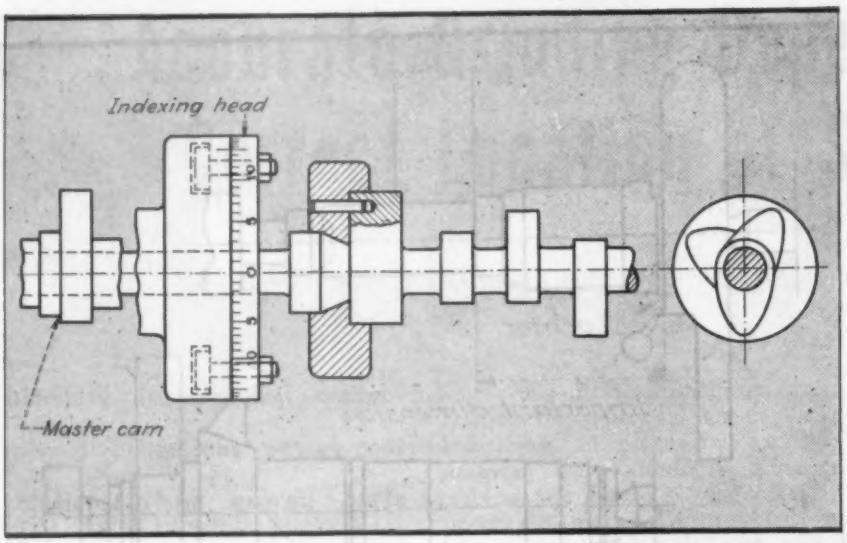


It is essential to use the end of a part of this kind as the locating point when the dimension that must be held is bounded by one end of the piece which contains the center hole, in order to maintain definite relation with other points on the shaft.

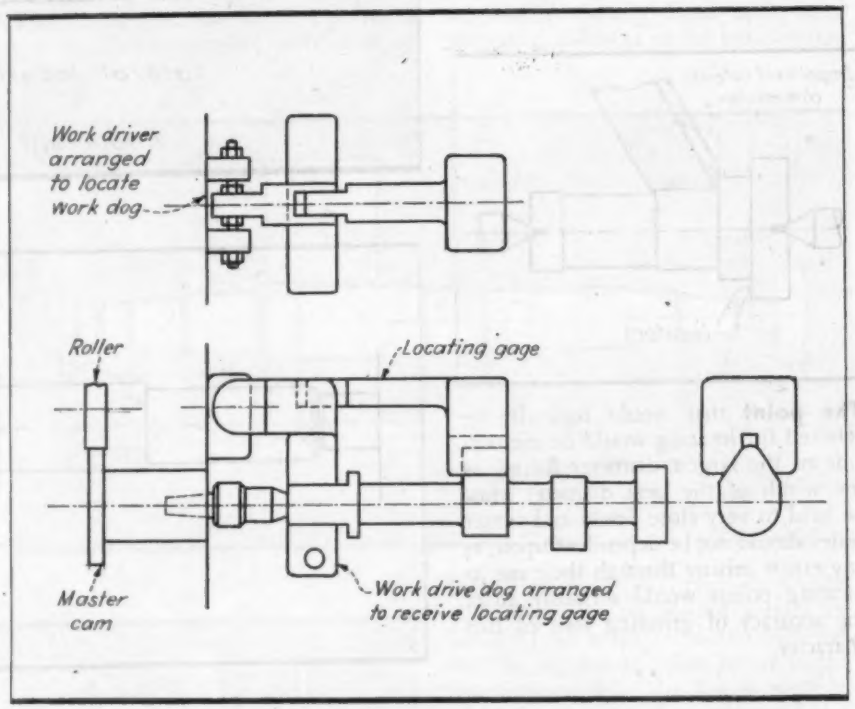


★

Grinding a profile with a formed wheel is a type of job that requires absolute accuracy in locating the grinding wheel, as the thickness of the flange, as well as the profile, must be closely held. The point used for locating in such cases should be as close as possible. In this set-up it is the left-hand bounding surface of the flange



Another method of angular locating for use on camshafts by means of an indexing head interposed between the master cam and the work drive dog, which is connected to the end diameter of the camshaft by a drive pin. This indexing head is used for grinding like cams arranged at different angles.


Work driver arranged to locate work dog
Roller
Locating gage
Master cam
Work drive dog arranged to receive locating gage

All cams have been roughed out on a cam lathe and the cam shaft is located from this rough cam for finish grinding of all cams. The locating gage is removed after the part is set up and the cam is finish ground at the same time the other cams are finished

Small Wire Cleaned by Liquid Bath

THE METHODS formerly used for stripping resinous compounds from the smaller sizes of wire, above No. 38, for lead terminations, junctions, taps, etc., usually consisted of scraping, heating, or dipping into hot solder, or acid. Various liquids and chemicals have also been used at times for removing resinous coatings from small wires, but so far as is known none of them would soften the film coating sufficiently for safe, easy stripping in the short time allowed for this operation in quantity production. All such methods investigated embodied some operational extreme which was hazardous to personnel or material.

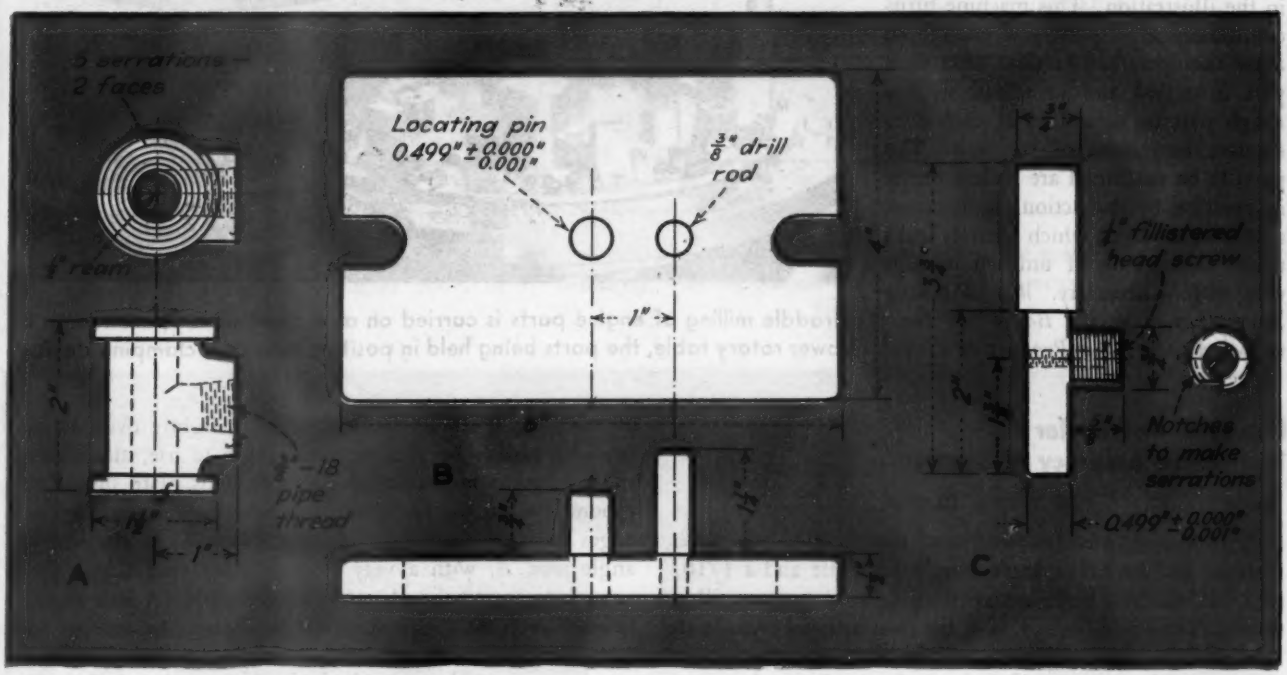
As all these methods have proved unsatisfactory in one way or another, a new method has been developed by the Fairchild Camera and Instrument Corporation. This method consists of immersion of the coated wire progressively in two liquids, which permits mechanical removal of any resinous compound coatings from fine wire without any harmful effects.

The new method has been used on 10,000 small motor armatures where the lead terminations average 14 leads per armature. It is estimated that each stripping operation can be completed in less than 30 seconds and that the use of the method results in a 50 percent saving in man-hours.

The liquids used for removal of resinous coatings are known as Materials A and B. The useful life of Material A at the working temperature is about four hours, after which it is discarded and the inside of the pot cleaned. A fresh supply of the material is then used. Material B is a colorless liquid. It is heated in a temperature-controlled bath to an optimum working temperature, ranging from 120 to 140 F. in two pots of a few cubic inches capacity each.

Practical Ideas

★ **War-Winning Suggestions appearing on these pages were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive. They are freely offered to industry as an aid to war production** ★



The tool C was developed to cut serrations on two flanges of aluminum casting A. The jig for locating castings, at B, is fastened to the table of the milling machine

Novel Tool for Cutting Serrations On Flanges of Aluminum Castings

BY ROBERT W. MAWSON

The first part of an interesting operation for forming serrations on several thousand small aluminum castings, the details of which are shown at *A*, was performed on a turret lathe, the castings being held in specially designed chuck jaws. The most interesting part of the machining, however, was the secondary operation, that of forming the serrations on the two flanges.

The fixture which was used to hold the piece during this operation is shown at *B* and was made of a piece of steel in which had been inserted a locating pin, machined to a good sliding fit in the ½ in. reamed hole of the piece. A ⅝ in. pin had also been inserted in the fixture 1 in. from the locating pin, or plug. Two slots were machined, one on each end of the fixture, so that it could be fastened down securely on the table of the drilling machine on which the operation was performed.

The tool *C* used to form the serrations was made from a piece of drill rod ¾-in. in diameter and 3¾-in. long. This piece of drill rod was turned and ground for a distance of 2 in. so as to be a good running fit in the ½ in. reamed hole of the piece. The balance of the tool was left in its original ¾-in. diameter and this portion was held in the jaws of the drill chuck.

A tool steel ring was machined with the desired serrations to be formed on the casting, a hole drilled and counterbored to take a ¼ in. fillister head screw and a surface milled to form the cutting surfaces. This ring was then properly hardened for the material to be machined and attached to the shank with a ¼ in. fillister head screw.

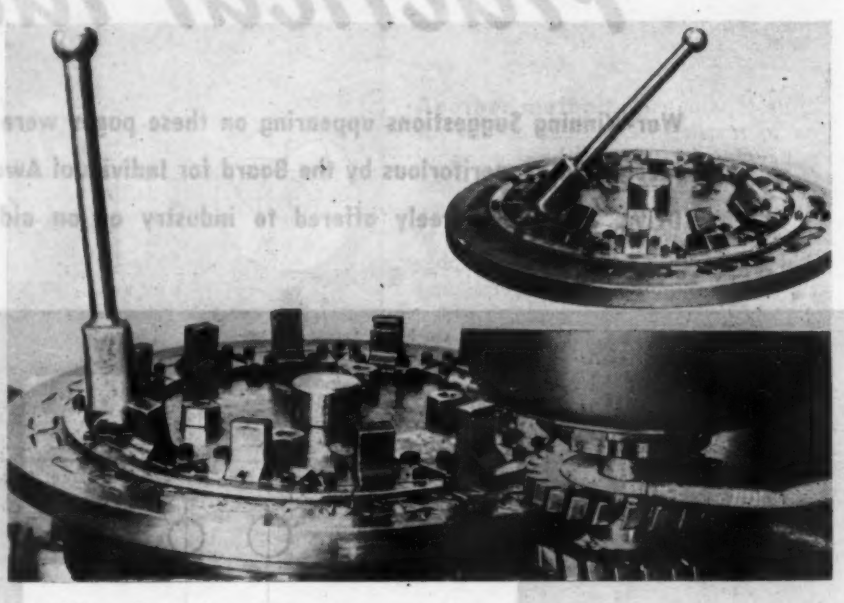
In operation the fixture is fastened by means of two screws to the table of a small vertical drilling machine, with the serration tool held in the chuck jaws. A piece to be serrated is placed on the center locating plug of the fixture and the casting is prevented from revolving by a ⅜ in. pin in the fixture. The revolving serrating tool is fed down onto the casting and the desired notches formed. Another interesting feature of this tool is that the cutting edge can be adjusted to obtain the best machining results by moving the ring around on the the fillister head screw and when the proper cutting surface has been obtained the screw can be tightened and the ring fastened securely in place.

PRACTICAL IDEAS

Power Rotary Table With Clamping Device

BY DAVID L. WELTY
Douglas Aircraft Company

A standard power turntable, mounted on a vertical milling machine and which holds 24 motor parts when fully loaded for straddle milling, is shown in the illustration. This machine turns continually at a speed low enough to allow the operator to unload after each part is milled and to reload with a rough part to be milled at each consecutive movement of the unit. The parts to be machined are locked firmly in position by the action of the camshaft control lever, which securely locks them. Reworking of finished parts is very seldom necessary. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

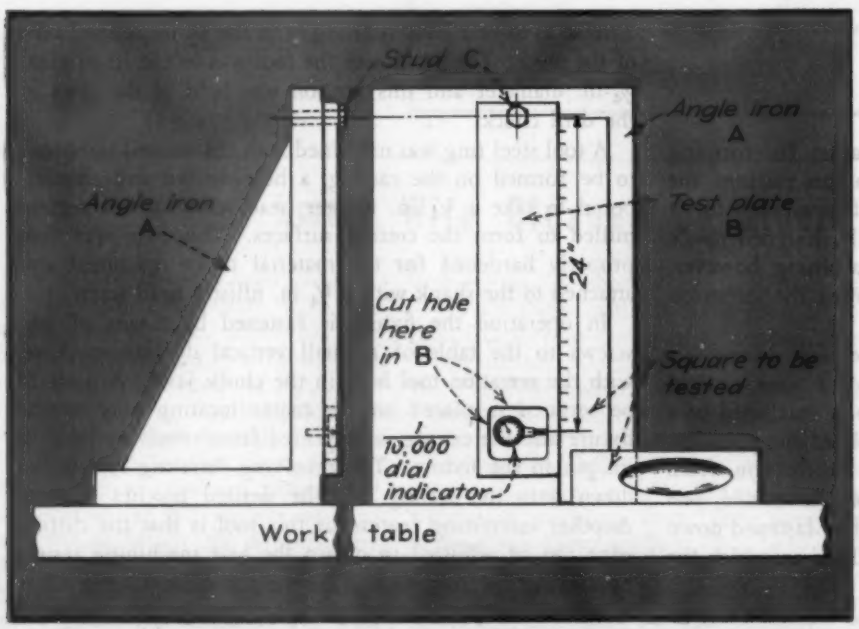


Straddle milling of engine parts is carried on as a continuous operation on a power rotary table, the parts being held in position by a cam clamping device

Improved Method for Testing the Accuracy of Squares

BY FAY E. CLARKE

An improved method for testing the accuracy of squares includes the use of an angle iron, a flat plate and a 1/10,000 dial indicator gage, as shown in the accompanying illustration. The angle iron, *A*, is of the conventional type, fairly accurate, flat on the bottom and resting on a good metal table or surface plate, which must also be flat and true on the top. A flat plate, *B*, should be about as long as the blade of the longest square to be checked. Slightly over 24 in. would probably be a convenient length to use, although a shorter length might be satisfactory. This plate should be ground flat on the back and on both edges and these two edges must be truly parallel. The plate, *B*, is attached to angle iron *A*, with a very close fit over stud *C*, yet free enough to permit the plate to swing slightly. A hole should be cut in *B* at the bottom large enough to receive the 1/10,000 dial indicator with some clearance. The indicator is mounted on angle iron *A*, with its shaft point contacting the side of the hole in plate *B* at a point 24 in. from the center of stud *C*, for convenience in showing accurate readings in making tests, so that any movement of plate *B* either way from vertical will show the exact amount of movement on the dial indicator.



The accuracy of squares can be tested within very close limits by means of a device with a movable steel plate which actuates a 1/10,000 dial indicator

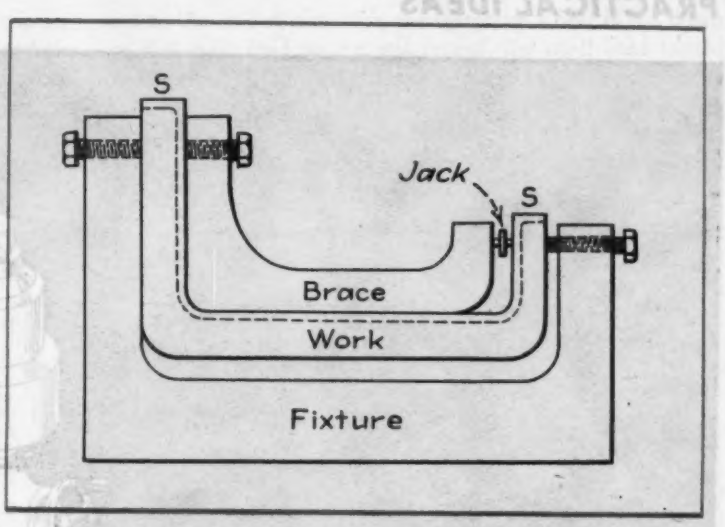
In using the device the square to be tested should be placed on the table top, with the blade against the edge of plate *B*, which will swing to make contact with the whole length of the square. It should be held firmly in that position and the dial of the indicator should be set at zero. The square should then be set up on the opposite side of *B* and the plate swung to make contact on the square blade as before. The reading on the indicator will then show double the error of the square in 24 in., or the exact amount of error per foot. While the gage shown in the illustration was designed to test squares 24 in. in length, a shorter type can be used and will prove satisfactory where the majority of the squares to be tested are of less length.

Supporting Brace Used in a Plate Milling Operation

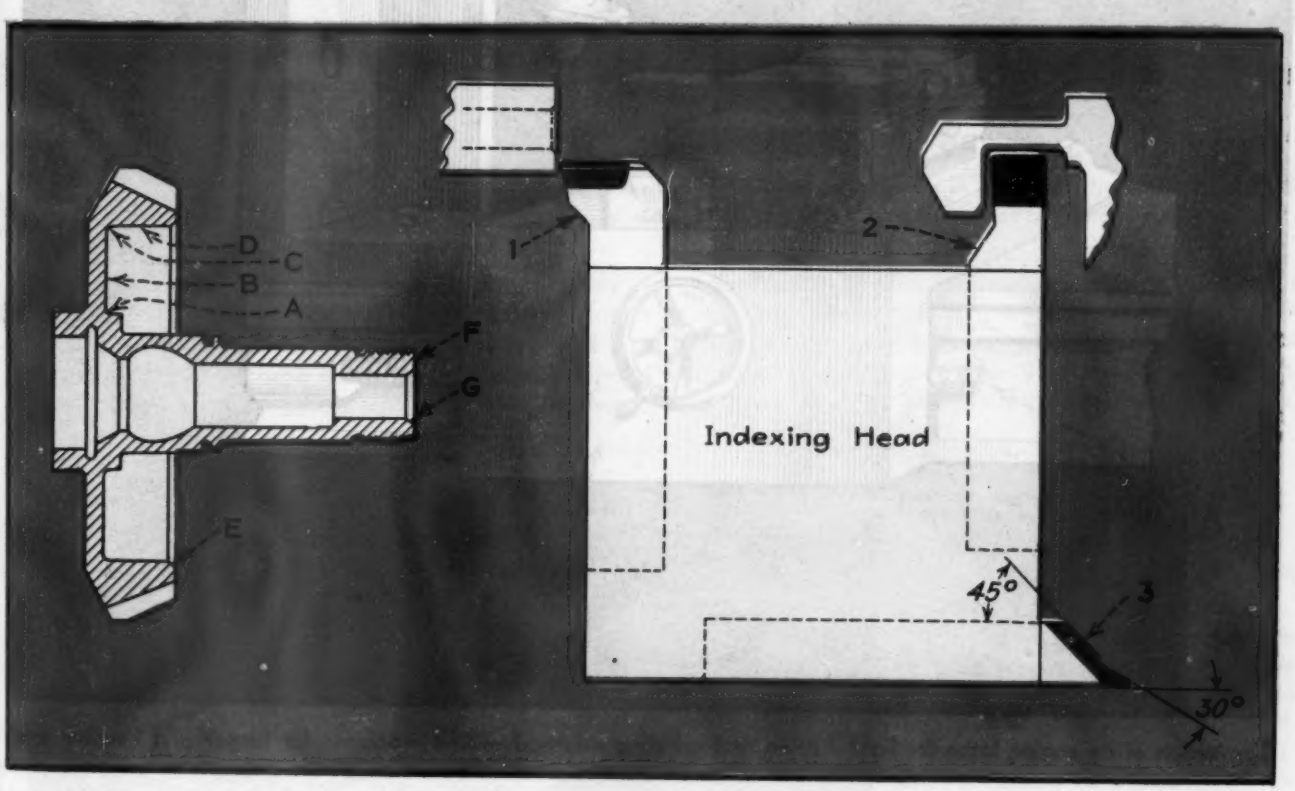
BY FRED H. COLVIN

A fairly large piece built up by welding supporting ribs to a steel plate had to be milled on the outer members at the points *S S*, as indicated in the accompanying drawing. The dotted line gives an idea of its construction. Although this was fairly heavy plate and well braced by ribs, it was not sufficiently rigid for milling these surfaces without support between the arms at each side.

The necessary support was provided by a heavy brace, which was inserted inside the arms as shown. The work was clamped between the two screws at the left, but at the right a small screwjack was used between the brace and the work, as shown in the illustration. The brace was a heavy casting that provided ample support. Means were provided for lifting it when setting the piece in place, or removing it.



A fairly heavy plate, which was not sufficiently rigid in itself for milling, was supported by a removable heavy brace which was inserted in the set-up



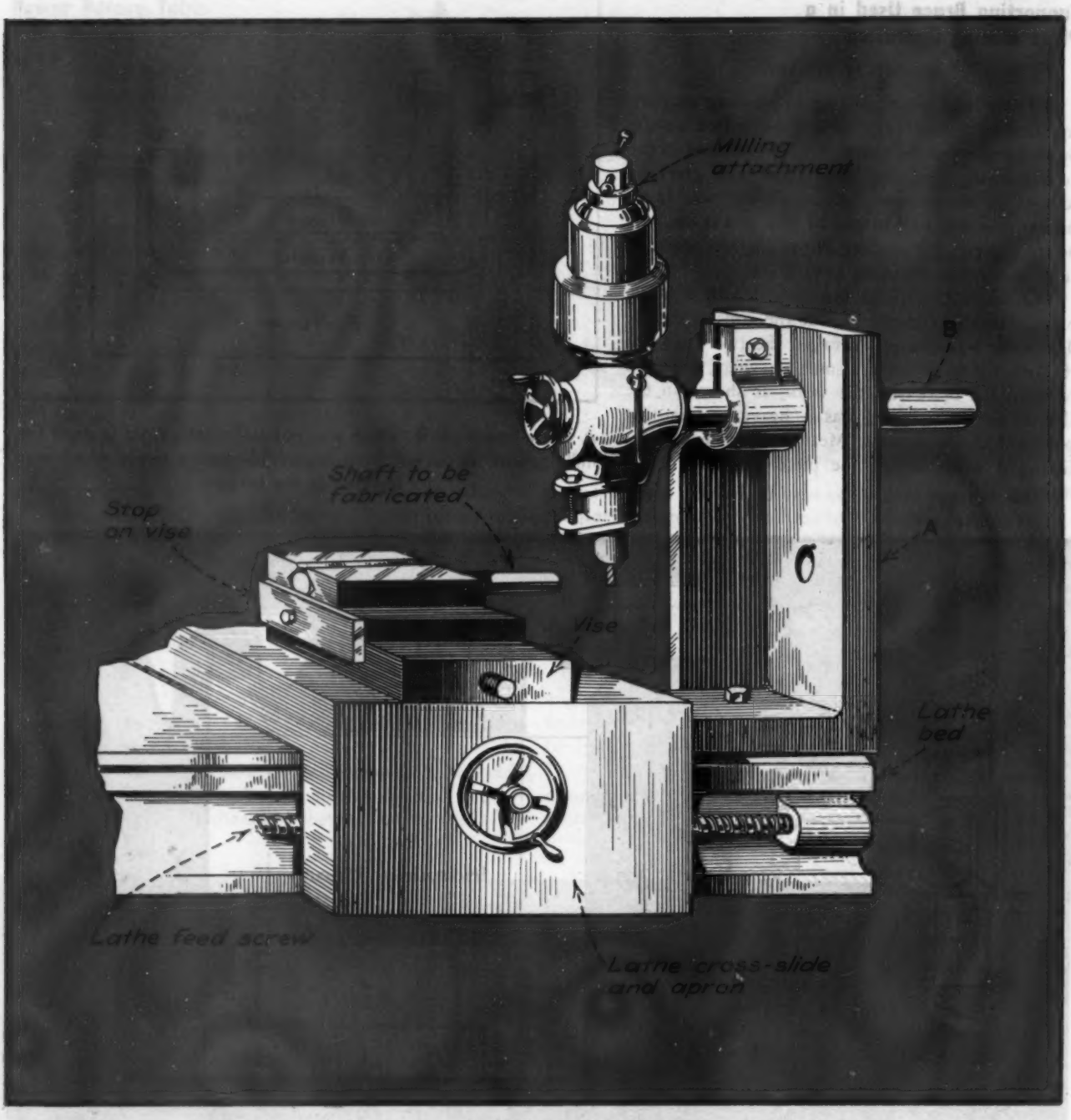
Three specially designed carbide-tipped forming tools replaced eight toolbits and a center reamer

Carbide-Tipped Tools for Gear Forming

BY GUY CECHIM
Packard Motor Car Company

Eight toolbits and a center reamer, which were formerly required for roughing and finishing an engine gear part on a screw machine, have been replaced by three specially designed carbide-tipped forming tools, which perform all of these operations. These three tools, which are held in the cross-slide toolpost of the screw machine, combine roughing and finishing operations, and result in a mirror-like finish. A top view of the indexing head with the new forming tools shows that tool #1 performs the facing operation at *F*, tool #2 cuts radii at *A* and *C* and faces at *B* and *D*, while tool #3 cuts chamfers of 45 deg. at *E* and 60 deg. at *G*.

A saving of 2860 man-hours per year was realized. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Conversion of an engine lathe for light cutting and grinding released milling machines for larger and heavier jobs

Engine Lathe Set-Up for Cutting Keyways, Splines and Grinding Flats

BY ERNEST J. HEYMAN
Consolidated Car-Heating Company, Inc.

Cutting of small keyways, splines or grinding flats on shafts usually requires a surface grinder, a milling machine, or special purpose machinery. An engine lathe can be utilized for these purposes, however, and set-ups can be made quickly. An L-shaped supporting casting *A* was made of a width to fit across the ways of a lathe and machined to locate on them. This casting is locked on the bed with two bolts which thread into a loose cross-piece inside and across the bed. The casting carries a boss which is split in two places, as shown. One bar locks the round supporting bar in place. The other split is to cut the ears of the boss from the back of the casting to permit them to be squeezed together. A hole in the back of the casting permits longer shafts to extend through when necessary.

The round supporting bar *B* is of sufficient length to permit extension and is of sufficient diameter to support a small motor-driven vertical milling attachment. There are several types of these devices on the market. The addition of a self-centering vise, or one with V-jaws mounted on

the compound rest, or on the cross-slide, completes the set-up. During the operation the leadscrew is used to feed the work into the milling cutter, or grinding wheel. A locating stop mounted on the vise locates the start of the cut. A stop on the lathe bed locates the end of the cut.

Where a keyway or flat is required which does not come out to the end of the shaft, the cutter, or wheel is fed down by the quill feed of the attachment, the quill feed locked and the feed screw thrown into operation.

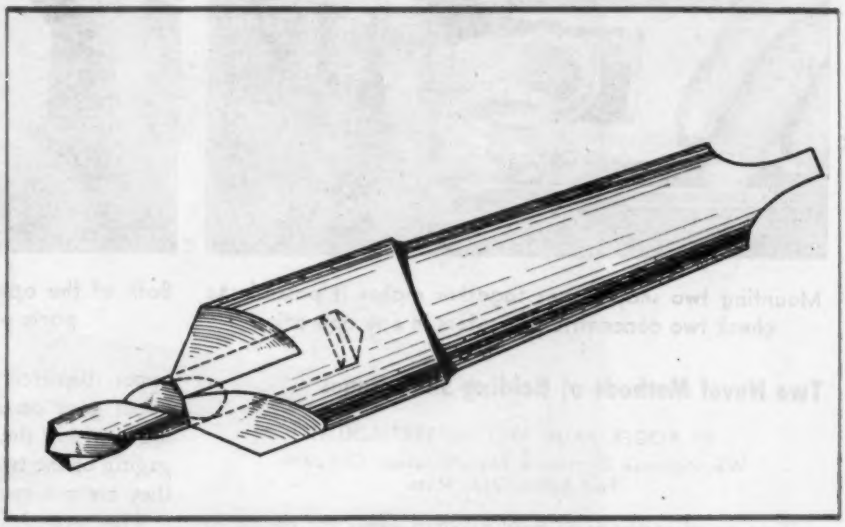
Flats may be ground by substituting a cup wheel for the end mill. A dividing head for the vise permits cutting splines and the set-up can be utilized for many applications.

Broken Drills and Countersinks Make Useful Combination Tools

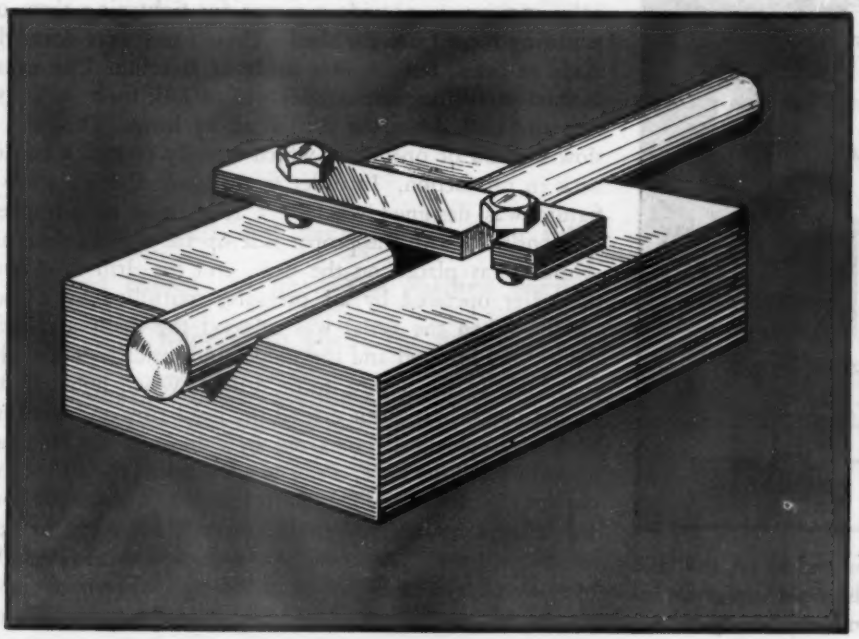
BY WILLIAM H. CASE
Moore Dry Dock Company

Drilling and countersinking of parts were formerly carried on as separate operations at this plant, which practice resulted in the breaking of many 5/16 in. drills, primarily because of their length, although careless handling was also responsible to a large degree.

In order to eliminate such breakage and loss of time a method was designed for doing the job in one operation, by combining the drill and countersink in one tool. Broken drills, with only short flutes remaining, were found to be more suitable than new, or long drills for the purpose. Such tools furnish the best drilling and holding power for the cross key pin which is inserted through the joint between the drill and countersink. The countersink is shallow and small in diameter and a discarded tool is satisfactory for the purpose. This combination insures greater strength and stability in the drill, as it is well supported by the countersink point. About the only expense incurred in making up the combination tool is for detempering the countersink, drilling and retempering it. The elimination of continual drill breakage has resulted in substantial reduction in tool costs and a considerable amount of time has been saved. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Reconditioned drills, mounted in discarded countersinks, make useful combination tools for drilling and countersinking in one operation instead of two, and eliminate a considerable amount of drill breakage



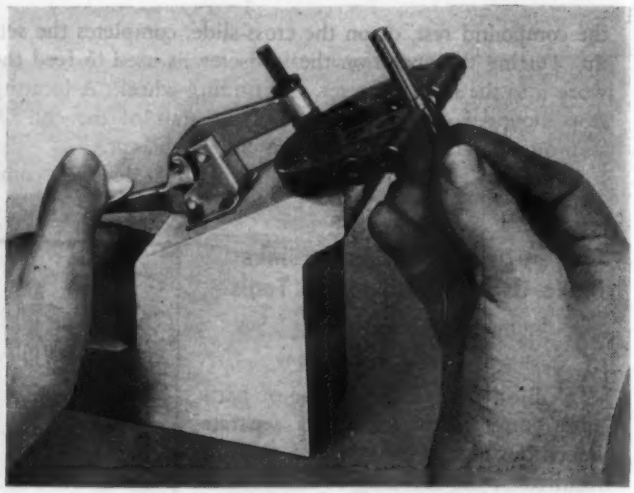
Hold-Down Clamp for V-Blocks

BY RONALD EYRICH

A hold-down clamp to be used with a V-block is shown in the illustration. These clamps have been installed on all the V-blocks in the shop and have added appreciably to their utility and their use has speeded up the work materially. The unit is complete in itself. It consists of a bar $\frac{1}{2} \times 2$ in. and long enough to span the V-block. A hole was drilled in one end and a notch was cut into the other, so that the bar could be swung out to facilitate inserting and removing the work. Two $\frac{1}{2}$ in. capscrews were used to hold down the bar on the work.

Addition of clamping bars to V-blocks increases utility, speeds work

Mounting two snap gages together makes it possible to check two concentric diameters in one operation



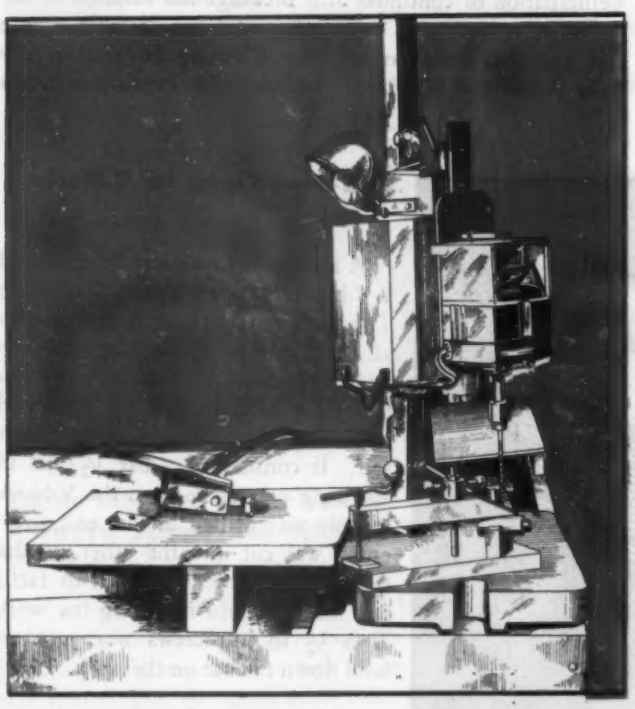
Both of the operator's hands are left free for changing parts when using this snap gage holder

Two Novel Methods of Holding Snap Gages

BY ROGER PAUL AND HERBERT SOUTH
Westinghouse Electric & Manufacturing Company,
East Springfield, Mass.

Two novel methods of holding snap gages are shown in the accompanying illustrations. One of them shows two gages mounted together for checking two concentric diameters in one operation. The lower gage is fastened to a flat steel surface and the piece being inspected is moved into the gage. The piece is then held firmly within this gage, while the upper gage is moved over the smaller, or upper diameter. This is made possible by mounting the upper gage on a T-slot arrangement so that it is free to move within the space allowed by the T slot. This permits gaging of the two diameters accurately for size, even though they are not exactly concentric with each other.

The second illustration shows a snap gage held in a homemade holder. The holder consists of a wood block, cut out to a suitable shape, with a spring vise mounted on the block for holding the gage. This leaves both hands of the operator free to move parts in and out of the gage. The vise is of the quick acting cam type, so that gages can be changed quickly without the use of tools.



Addition of an air cylinder to raise and lower the drill head, instead of doing it by hand, brought about an increase in fuze production from 175 to 480 pieces per hour

Air Cylinder Speeds Drilling of Fuzes

BY A. B. SCHUYLER
International Business Machines Corporation

It has been regular shop practice to drill two wrench holes in fuzes to provide a means for tightening them or removing them from the shell. These fuzes were formerly made of brass, but are now made of Bakelite. The usual method of drilling these fuzes was to lock them in a fixture and pull down the drill head by hand. This was a slow method of operation, which actually created a bottleneck in production. In order to overcome this situation a fixture was designed whereby a fuze body was dropped into position, with the proper side up for drilling. An air cylinder was placed on the drill, and the drill head was thereafter operated by air pressure, controlled by a foot pedal. When the pedal was released the drills and drill guide were lowered and the guide automatically locked the fuze body in the fixture, to be drilled. When holes of the proper depth have been drilled the head rises and the fuze body is automatically removed by a blast of air from an outlet beneath the table. Prior to adoption of the air-control method the rate of production had been 175 pieces per hour and after adoption the production rate increased to 480 pieces per hour. There was also a marked decrease in the number of rejections. *War Winning Suggestions from the Board for Individual Awards, War Production Drive.*

Patrol Craft Mass-Produced On Welding Assembly Line

BY F. M. GUNN, Works Manager, Pullman-Standard Car Manufacturing Company

Complete hull and deck sections are fabricated indoors in jigs. The finished sections are then shipped to yards for final assembly

THE SPEED with which Pullman-Standard Car Manufacturing Company has been able to produce PCE (patrol craft escort) vessels for the U. S. Navy has been due largely to the adopted procedure of prefabricating the hull in 14 major sections in a building which permits around-the-clock operation in any weather. These sections are then delivered to the shipyard where they are joined to form the complete hull. Likewise, the deckhouse is prefabricated in four sections before delivery to the shipyard. These vessels are almost entirely of welded construction.

Prefabrication of the 14 hull sections is carried out in a large two-bay building at the Pullman works, and then the sections are mounted in cradles on special flat cars for transfer to the shipyard several miles away. One bay of the hull building is given over to the cutting and forming of various plate and rolled steel parts needed for the ship. Here also is done the subassembly, by welding, of deck sections, keel sections, bulkheads, gun platforms, engine and pump foundations, and other units which are combined

The use of levers for bending strake plates, as shown (left), was suggested by a Pullman-Standard Car employee. This method insures more accurate plate bending and effects a saving in time and effort

later to form complete hull sections. In the other bay are large welding jigs in which various hull sections are assembled, as well as a number of jigs in which the hull strake plates are subassembled.

All plate and rolled sections (I-beams, angles and T-beams) used in the ships are cleaned by pickling in a muriatic acid solution, followed by a water dip, Oakite solution dip and final water dip and then painted to prevent rusting. Upon delivery to the plate shop, the plates and other sections are laid out with templets and sheared or flame-cut to shape. Many parts must be bent to fit individual requirements, so these are delivered to a blacksmith group for bending. Templets used for laying out parts, and checking bent shapes are made from wood. Layout men must be trained to use the templets, since they must be read like a blueprint. When a layout is completed, the part is marked with paint to correspond with data given on the templet.

Plates are cut to shape at a 12-ft. heavy-duty plate shear, with oxyacetylene torches, depending upon the shape required. Plates longer than 12 ft. have been sheared by moving the plate among supporting rollers in front of the shear after each cut. Some strake plates are bent to the radius required in 16-ft. plate rolls, but most such plates are hot-bent over steel forms.

Where plate sections larger than standard size are required, two or more plates are joined by welding with a portable Unionmelt head. This usually is re-

Each welder has one of these tool kits to hold his electrodes, scaling hammer and wire brush. The box is fabricated by welding. It helps insure good housekeeping in the welding shop

quired in the assembly of deck subassemblies, most of which are of considerable size. Plates are laid out and joined in a predetermined welding sequence to minimize buckling, then transferred to a tack welding jig. The jig base has supports which hold the plate at the camber required for that particular deck section. Clamps hold the plate against these supports. Cambered deck girders and deck beams are positioned and tack welded to the plates, and to each other, so the assembly will hold the required shape. The unit then is removed from the jig to a cambered support section where girders and beams are arc-welded to the plate, and the unit is transferred to a straightening table where the shape is corrected, as required, and the periphery burned to shape.

Full Welding Specifications Given

Other subassemblies follow essentially the same procedure, with jigs being used only when the plates must be cambered. Keel units, engine and pump foundations, and similar subassemblies usually are welded upside down so as much welding as possible is done down hand. Drawings for each subassembly specify size of the fillet for each weld. Accompanying information specifies the number and sequence of the welds to be made. Gages are provided to insure that fillets are made to the correct size. Before any subassembly is delivered to the hull department, it is checked for size and shape by a company inspector and a Navy inspector. In addition, each job card is stamped with the inspector's approval.

Definite assembly and welding procedures have been worked out for each subassembly, and for the assembly of each hull section, so joints are made properly to prevent internal strains being developed, and to minimize distortion. While some subassemblies require straightening after welding, little trouble with distortion has been encountered in the final assembly of hull sections. Care required in making subassemblies is demonstrated by the fact that the maximum gap permitted when fitting bulkheads, decks, and other subassemblies in a final assembly jig is 1/16 in. All welds are made with coated electrodes. Usually weld fillets range from 3/16 to ¼ in., depending on the thickness of the parts.

Truck-Mounted Jigs Aid Alignment

In the hull department, jigs in which all except the last two stern sections of the 14 hull sections are assembled, are mounted on heavy trucks so they can be moved along rails to bring any two adjoining jigs together. This makes it possible to move two hull sections together to check alignment of various strake plates, deck plates and other units before the hull sections are shipped to the yard. This procedure seldom is necessary, since the hull sections have been found to line up with surprising accuracy. Insofar as possible, each hull section is completed before shipment, in order to minimize work necessary at the shipyard, and so speed the launching of these vessels.

The bow, or No. 1 hull section, is built in a series of three horizontal jigs before being set-up vertically in the final bow jig for finishing operations. All of the other hull sections are built up complete in the final jig, with the exception that for sections Nos. 2 to 12 inclusive, the strake sides are made up in half units, one for each side of the ship, in special fixtures which can be tilted 90 deg. to bring either side level and so permit down hand welding of the frames to the strake plates.

Engine foundation, pump foundation and keel subassemblies usually are completely welded in an inverted position so that most welds can be made down hand

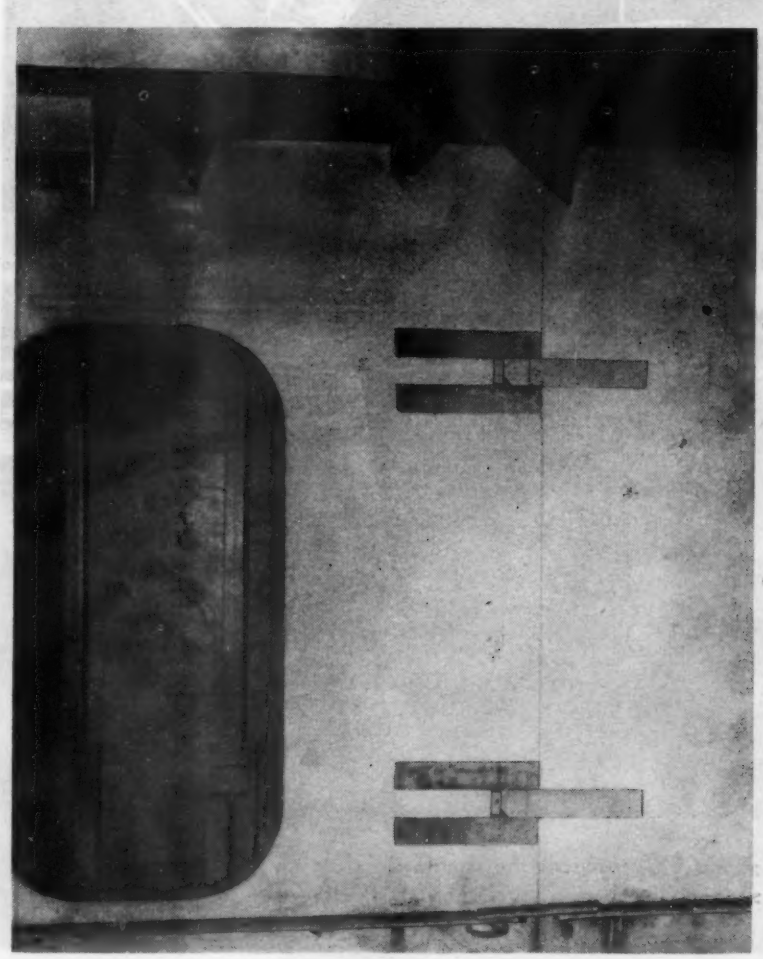
As assembly of each hull section progresses, various deck plates, bulkheads, and other subassemblies, including engine and pump foundations, are fitted and welded in place. These units are aligned with plumb lines and a surveyor's transit. The hull section interior is gradually built up from the keel to the final fitting of the top deck plate, so as much welding as possible can be done in the open. Final assembly jigs for the center hull sections each hold two hull sections and mating edges are aligned carefully while sections are in position in the jig. When completed, each hull section is lifted by overhead crane to a special cradle on a flat car, designed to support the section without twisting or straining during transportation to the shipyard. A special boom with cables which fit around the outside of the hull section is used to transfer each section to its flat car. Each section has 2 in. of stock on the forward end when delivered to the shipyard where it is laid out for mating with adjoining sections and burned to size.

Key Plates Simplify Deckhouse Fitting

Like the hull sections, the four sections which make up the deck house assembly are completed in the welding shop before shipment to the yard. A complete deck house assembly is made up of more than 9,500 individual parts, exclusive of bolts, nuts and similar standard items. Each deck house section is of such size and shape that it can be moved to the shipyard on a standard flat car. The complete deck house is assembled at the shop to insure alignment of the four sections, and key plates are welded along the side of each joint to minimize fitting time when the deck is assembled on a vessel. Each of the bottom three sections is built upside down, so bulkheads can be welded to the top, or deck plates, and then the assembly can be turned on its side for down hand welding of vertical seams on one side of the bulkhead. When this has been done, the assembly is turned over on its other side for down hand welding of the seams on the other side of the bulkheads. The top, or bridge section, is built on top of the intermediate or second story section of the deck house and then removed to a flat car for shipment. In each of the deck house units, electrical outlet and junction boxes, ventilation duct openings, portholes and ballistic covers are fitted in the shop. In some cases watertight doors are fitted while the deck house is being built up in the shop, and in other cases these doors are fitted at the shipyard. It is of interest to note that the heaviest section of a deck house assembly weighs about 25,000 lb. when ready for shipment.

Strake assemblies for the eleven center hull sections are prefabricated in these fixtures before being transferred to the main hull assembly jigs. Strake plates and formed beams are joined with as many welds as possible made down hand. These fixtures are tilted from one side to the other by overhead crane

Two adjoining hull sections are assembled in each main jig. First, strake plate assemblies are joined to the keel sections and then bulkheads, deck plates, engine and pump foundations and other subassemblies are fitted and welded in place as required



Key plates welded to each deck house assembly insure proper alignment of the four units when they are joined together at the shipyard

Novel Tooling Developed

Skiving, tapping and boring are adapted to problems involved in handling big units by standard procedures on standard machines

A special tailrest, with movable bearing box, replaces the standard fixture on this boring machine. The auxiliary post and cradle support the boring bar when it is withdrawn from the work

To Machine Diesel Cylinder Blocks

PROBLEMS entailed in the machining of 6-cylinder Cooper-Bessemer cylinder blocks, using existing shop equipment for the handling of subcontracts at Warner & Swasey, have resulted in three distinctive tooling developments.

These cylinder blocks are complex weldments but possess inherent balance in their structural design. This feature, coupled with the quality of welding which is followed by complete normalizing, has eliminated the usual difficulty of compensating for stresses set up during the machining process. As a result, rough and finish planer cuts and similar operations were reduced to more or less standard procedures, by which tolerances of 0.001 in. or less are held consistently.

Salient problems of this particular subcontract job led to the use of skiving to finish the integral halves of the cam bearings, machine tapping of the holes for stud bolts to "Class 5" tolerance, and a 5-in. horizontal mill for boring openings for 6-cylinder liners.

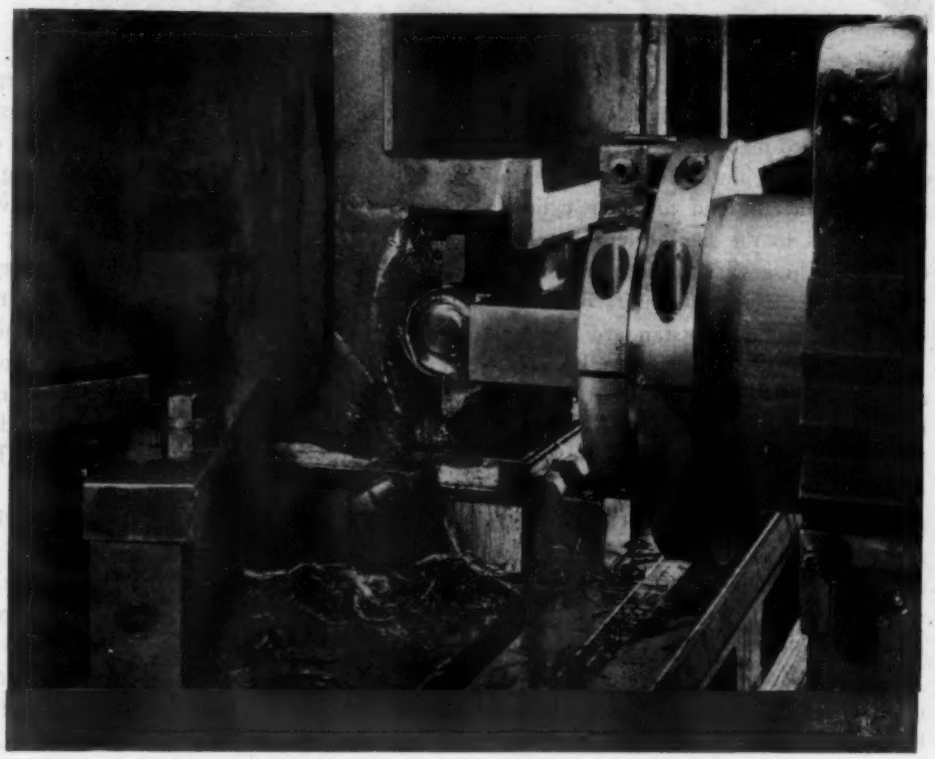
For machining halves of the cam bearings integral with the cylinder block, a ball cutter mounted in a planer milling machine was tried. The bearing finish achieved by this method, however, was not fully desirable. Sciving, although a more difficult operation, can be accomplished with the same set-up as that necessary for standard over-all planing operations on the cylinder block. The consequent saving in set-up time compensates for the greater difficulty of the sciving, which in turn produces an accurate finish of finer quality.

Wide Tool Used on Cam Bearing

This operation requires the equivalent of a planing tool approximately 4-in. wide, since the tool used must match the entire contour of the lower half of the cam bearing surface. The operation becomes likewise an intermittent cut, which makes it necessary to mount the semi-circular cutting tool in a gooseneck toolholder.

Cam bores are first roughed out for alignment with a regular planing tool. The skiving, which follows, cuts 0.001 in. with each pass. Bearings are shaved to a diameter of 2.375 in. within a tolerance of plus 0.0005 to minus 0.0000. A planer miller is used for this skiving operation, with the spindle stopped and the planing feature only being used.

The tapping of 1 3/8-in. 12-pitch holes to "Class 5" tolerance, to receive the cylinder head studs, was assigned to the Warner & Swasey precision automatic threading and tapping machine. With it, speed and feed of tapping are accurately and automatically controlled by a hob cut in brass with the same tap used in the actual threading operation. Accuracy within



★

Good finish is obtained on integral halves of cam bearings by a skiving operation. The cutting tool takes a finish cut about 4 in. wide in the end bearing surface of the diesel cylinder block

This special fixture is used for skiving cam bore of engine case on a planer miller. The slot is cut more than half way through, so pressure on the tool causes it to spring away from the work instead of biting in more deeply

★

limits of the tap itself, therefore, is made certain.

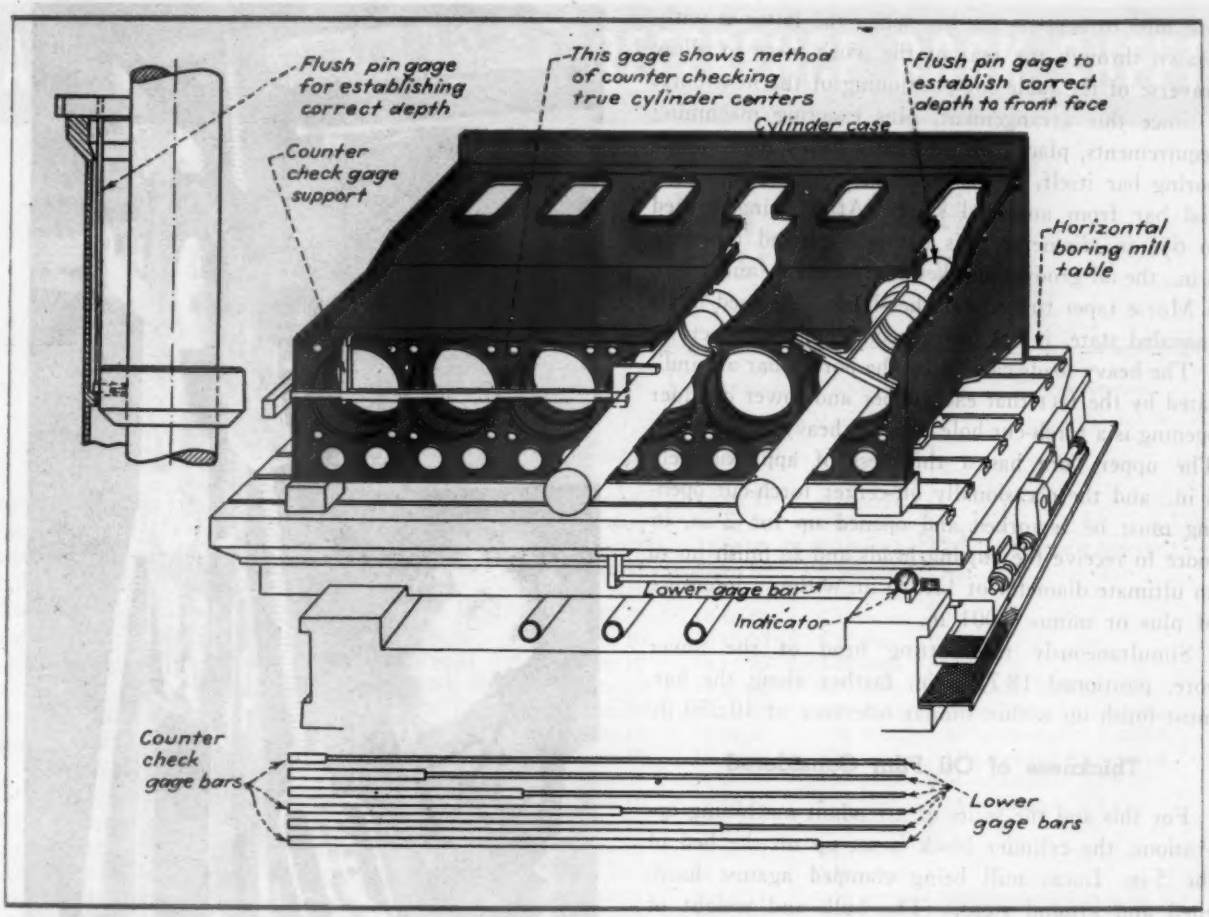
However, sufficient variation exists between various work pieces to make selection of taps necessary. The density of boiler plate varies surprisingly. Some hard spots are encountered and one cylinder block may not tap out to the same tolerance as the next in sequence. These variations in material are found to fall within the minute limits of difference between individual taps of the standard size required.

To meet this situation, all taps are precision checked on a Pratt & Whitney measuring machine. One slightly smaller than would seem required is used in the first hole of a given cylinder block. If the "go" gage will not enter, a tap which measures fractionally larger is used. This delicate operation can be performed successfully with the precision tapping machine, and the tap ultimately found satisfactory seldom fails to provide "Class 5" holes for the remaining studs in a given cylinder block.

Although on an 8-cylinder diesel engine case of another design Warner & Swasey has been successfully boring the openings for cylinder liners with special tools on a radial drill, the larger diameter of the bores in this Cooper-Bessemer case precluded duplication of such a method. A radial drill of sufficient size to handle the job was lacking and, in line with the company's policy of using available machine tools to the limit in place of creating a further excess of them for lack of tooling ingenuity, the job was assigned to a 5-in. horizontal boring mill, a part of the capacity of which was not occupied.

The magnitude of the operation immediately imposed problems. These cylinder blocks are 35¼ in. in height, 30 in. wide, and 81½ in. long. When set up on the bed of a 5-in. Lucas mill, they required its full machine capacity. The over-all size and diameters of the bores in relation to necessary clearance made it impossible to use a floating chuck for coupling the boring bar to the quill.

A tailrest, somewhat novel in design, was substituted for the standard fixture, which provided a movable bearing box secured by jackscrews both above and below, in place of the usual elevation screw. An auxiliary post, beyond the tailrest, was


Flush pin gage for establishing correct depth
This gage shows method of counter checking true cylinder centers
Flush pin gage to establish correct depth to front face
Cylinder case
Counter check gage support
Horizontal boring mill table
Lower gage bar
Indicator
Counter check gage bars
Lower gage bars

Hook gages and mating gages, as shown, accurately locate center distances for the boring operation. The flush pin gage bears directly on the face of the cutting tool, making it unnecessary to withdraw the boring head and bar. Too, this method provides a means of gaging the chamfer depth under difficult conditions

Two cutter heads are mounted on the special 6-in. boring bar to bore cylinder liner openings. A specially designed steadyrest is used to support the boring bar. Cutter heads on the table are used for roughing

provided to support the bar when the latter is withdrawn through the rear of the work piece to allow traverse of the table for positioning of the next bore.

Since this arrangement, plus exacting machining requirements, placed an unusually heavy load on the boring bar itself, it was necessary to provide a special bar from annealed steel. After being turned to 6¼ in. diameter, this bar was ground down to 6 in., the oil grooves and keyway were cut, and a No. 6 Morse taper turned for the shank. As used in its annealed state, it has proved completely satisfactory.

The heavy loads carried by the boring bar are indicated by the fact that each upper and lower cylinder opening is a torch-cut hole through heavy boiler plate. The upper bore has a thickness of approximately 3 in., and the occasionally off-center torch-cut opening must be reworked and opened up for 2 in. or more to receive the cutting heads and to finish up to an ultimate diameter of 11.625 in. within a tolerance of plus or minus 0.001 in.

Simultaneously the cutting head of the lower bore, positioned 18 7/32 in. farther along the bar, must finish up within similar tolerance of 10.250 in.

Thickness of Oil Film Considered

For this and the series of attendant machining operations, the cylinder block is set up on the bed of the 5-in. Lucas mill being clamped against hardened and ground stops. The bulk and weight of this work piece are such that the oil film on the ways varies sufficiently to require compensation when the full length of the traverse is used to bring the block into position for the bores at either end.

To provide for this, shims are used between the work piece and the positioning stops, and special bar gages, independent of the machine itself, are used to check the horizontal and vertical positions.

In the first working position, the bar is run through one of the middle bores. A mixture of red lead and oil, supplemented with lubricant from a side feed, is used to prevent freezing in the steady-rest bearing.

A preliminary cutter on the face head recenters the torch-cut opening and opens the way for use of the actual cutting tools.

The rough bore and chamfering operations leave 1/8 in. of stock for finishing, but in actuality must be held to close tolerance, since the holes for cylinder head studs are located from the upper bore as an intervening operation.

The rough cut opens the upper bore to a diameter of 11 1/2 in. The diameter of the upper bore is continued to a depth of exactly 2 in. at which point a chamfering tool, mounted in the same head, is used to decrease the diameter at a 30-deg. angle through the remainder of the bore.

Depth of this chamfer varies appreciably between one cylinder block and the next. Although its extent and depth are not important to the function of the engine, its angle, in relation to the vertical sides of the full bore, is important. When the cylinder liner is ultimately inserted, the collar which supports the liner at the upper end must fit snugly in this area, which takes the strain of combustion.

Milling ends of engine cases, to a finish of 15 micro inches is done on a planer miller

The lower bore is chamfered at a 20-deg. angle at the top, with the full diameter of the bore beginning at a point located 18 7/32 in. from the cylinder deck. A rubber grommet fits around the liner, flush with the top of the lower bore, as provided for by the chamfer.

After holes for the cylinder head studs are rough drilled (being located by a templet positioned in the rough-finished upper bore), both sequences are repeated to achieve final dimensions.

Standard Designations of Alloy Compositions For Heat and Corrosion-Resistant Castings

Revised designations for general composition of alloys for heat and corrosion-resistant castings have been issued by the Alloy Casting Institute. The list now comprises 52 designations, which are issued to assist the buyer to distinguish the general compositions most suitable for castings as contrasted to other specifications for alloys customarily used in wrought form. Composition ranges satisfactory for rolled products are often not desirable for castings.

Complete chemical compositions are not given with these designations because the exact chemistry of the alloy supplied depends upon the application. The conditions of use should be made known to the foundry, to permit suitable adjustment of the alloy composition.

In the case of corrosion-resistant castings, composition ranges with the designations show nickel, chromium and carbon content as well as the normal ranges of special alloy additions such as molybdenum, columbium and selenium. Carbon content is not shown for the heat-resistant alloys because in most applications it is not a critical factor.

All designations begin with the letters "C" or "H", indicating alloys for corrosion of heat-resisting applications, respectively. The second letter indicates the nickel and chromium ranges, the nickel increasing from "A" ta "Z". The following number designates the maximum carbon content in hundredths of one percent carbon. If special alloys are included in the composition, they are indicated by letters or symbols after the number: for example, M—molybdenum, C—columbium, Se—selenium.

Designation	% Nickel	% Chromium	% Carbon	% Other Elements
CA-14	1 max.	11 to 14	0.14 max.	—
CA-40	1 max.	11 to 14	0.20 to .40	—
CB-30	2 max.	18 to 22	0.30 max.	—
CC-35	3 max.	27 to 30	0.35 max.	—
CD-10M	3 to 6	27 to 30	0.10 max.	Molybdenum 2.00 max.
CE-30	8 to 11	27 to 30	0.30 max.	—
CF-7	8 to 10	18 to 20	0.07 max.	—
CF-10	8 to 10	18 to 20	0.10 max.	—
CF-16	8 to 10	18 to 20	0.16 max.	—
CF-20	8 to 10	18 to 20	0.20 max.	—
CF-7 Se	8 to 10	18 to 20	0.07 max.	Selenium 0.20 to 0.35
CF-7 C	8 to 10	18 to 20	0.07 max.	Columbium 10×Carbon
CF-7 M	8 to 10	18 to 20	0.07 max.	Molybdenum 2.5 to 3.5
CF-10 M	8 to 10	18 to 20	0.10 max.	Molybdenum 2.5 to 3.5
CF-16 M	8 to 10	18 to 20	0.16 max.	Molybdenum 2.5 to 3.5
CF-7 MC	8 to 10	18 to 20	0.07 max.	Molybdenum 2.5 to 3.5 *
CG-7	10 to 12	20 to 22	0.07 max.	—
CG-10	10 to 12	20 to 22	0.10 max.	—
CG-16	10 to 12	20 to 22	0.16 max.	—
CG-16 Se	10 to 12	20 to 22	0.16 max.	Selenium 0.20 to 0.35
CG-7 C	10 to 12	20 to 22	0.07 max.	Columbium 10×Carbon
CG-7 M	10 to 12	20 to 22	0.07 max.	Molybdenum 2.5 to 3.5
CG-10 M	10 to 12	20 to 22	0.10 max.	Molybdenum 2.5 to 3.5
CG-16 M	10 to 12	20 to 22	0.16 max.	Molybdenum 2.5 to 3.5
CG-7 MC	10 to 12	20 to 22	0.07 max.	Molybdenum 2.5 to 3.5 *
CH-10	10 to 12	23 to 26	0.10 max.	—
CH-20	10 to 12	23 to 26	0.20 max.	—
CH-10 C	10 to 12	23 to 26	0.10 max.	Columbium 10×Carbon
CH-10 M	10 to 12	23 to 26	0.10 max.	Molybdenum 2.5 to 3.5
CH-20 M	10 to 12	23 to 26	0.20 max.	Molybdenum 2.5 to 3.5
CH-10 MC	10 to 12	23 to 26	0.10 max.	Molybdenum 2.5 to 3.5 *
CK-25	19 to 21	23 to 26	0.25 max.	—
CM-25	19 to 22	8 to 11	0.25 max.	—
CN-25	23 to 26	18 to 22	0.25 max.	—
CS-25	29 to 32	8 to 12	0.25 max.	—
CT-25	34 to 37	13 to 17	0.25 max.	—
HB	2 max.	18 to 22	—	—
HC	3 max.	27 to 30	—	—
HD	3 to 6	27 to 30	—	—
HE	8 to 11	27 to 30	—	—
HF	8 to 11	18 to 23	—	—
HH	10 to 13	23 to 27	—	—
HI	13 to 16	26 to 30	—	—
HK	19 to 21	23 to 26	—	—
HL	19 to 21	28 to 32	—	—
HN	23 to 26	18 to 22	—	—
HP	29 to 31	28 to 32	—	—
HS	29 to 32	8 to 12	—	—
HT	34 to 37	13 to 17	—	—
HU	37 to 40	17 to 21	—	—
HW	59 to 62	10 to 14	—	—
HX	65 to 68	15 to 19	—	—

* Plus—Columbium 10×Carbon.

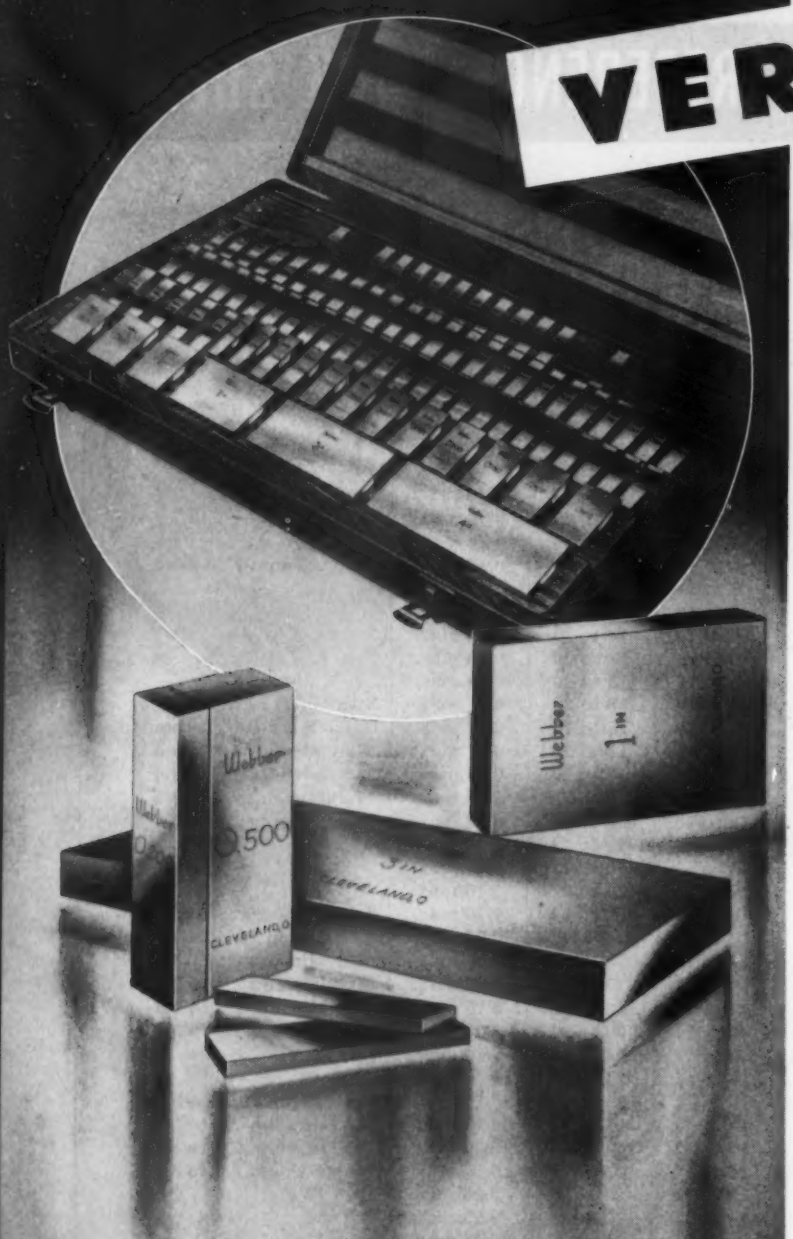
Designations with the initial letter "C" indicate alloys generally used to resist corrosive attack at temperatures less than 1200 F. Designations with the initial letter "H" indicate alloys generally used under conditions where the metal temperature is in excess of 1200 F.

All of the above designations apply to type compositions and no attempt is made to cover elements such as manganese, silicon and, in the case of heat-resistant alloys, carbon.

VERSATILITY

an important asset of

WEBBER GAGE BLOCKS



● Webber Precision Gage Blocks are performing an important service in maintaining dependable accuracy in tool rooms—in tool and die shops—in mass production plants.

Webber Gage Block Sets are more versatile—They offer about twice the normal range of measurements due to the .10005" block which permits measurements in steps of one half of one ten thousandth of an inch instead of the usual .0001". This block is included in all Webber No. 84-A sets.

Webber Blocks maintain accuracy longer. There are two reasons for this—first all tolerances are kept on the plus side in making the blocks. For example "A" sets have tolerance of .000004" or less and this is always a plus tolerance. Second—there are two .100" "wear" blocks with every No. 84-A set. These are used to contact the work—save wear on original blocks—maintain desired precision over longer periods.

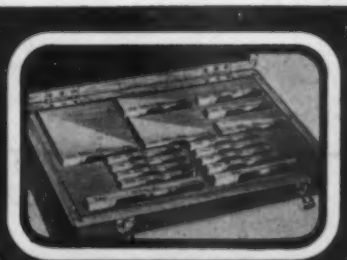
Thus Webber Gage Blocks offer greater versatility by doubling the range—have increased the life of the set with the two wear blocks—provide greater economy in making precision measurements from the tool room to the assembly line.

● ● ●

Webber's service includes every facility for inspecting—reconditioning and replacing worn or damaged blocks at a moderate cost.

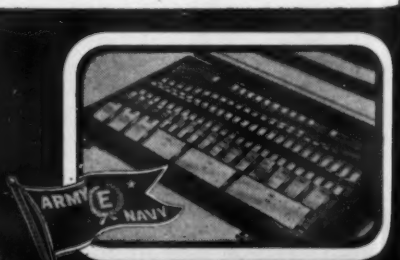
Prompt delivery is available on the following Webber Gage Blocks—

Set No. 84A		$350.00
Set No. 84B		$235.00
Set No. 43A		$185.00
Set No. 43B		$150.00
Set No. 38A	(Thin Blocks)	$195.00
Set No. 38B	(Thin Blocks)	$155.00
Set No. 14A	(Angle Blocks)	$450.00



Webber GAGE COMPANY

12901 TRISKETT RD. • CLEVELAND 11, OHIO



AMERICAN MACHINIST REFERENCE BOOK SHEET

Safe Operation of Resistance Welding Machines

UNDER THE AUSPICES of the American Standards Association, a war standard has been published on "Safety in Electric and Gas Welding and Cutting Operations (Z49.1—1944)". Sponsoring organizations were the American Welding Society, the International Acetylene Association, the National Electrical Manufacturers Association, and the Division of Labor Standards of the U. S. Department of Labor. As related to the installation and operation of resistance welding machines, the war standard specifies:

All equipment shall be installed in conformance with the National Electrical Safety Code and the National Electrical Code. There shall be a fused safety tap switch or its equivalent (such as a circuit breaker) conveniently located at or near the welder, so that the power may be shut off when servicing the machine and its controls.

The frames of all welders and the auxiliary equipment cabinets, if any, shall be grounded under the conditions and according to the methods of grounding electrical equipment covered in Article 250 of the National Electrical Code, except that where water-cooling is provided the welder shall be considered adequately grounded through water pipes electrically connected to the welder, and such pipes may be used as grounding electrodes for the auxiliary equipment ground connections.

Workmen designated to operate resistance-welding equipment shall have been properly instructed and judged competent to operate such equipment.

Spot Welders. For the safety of the operators, no external weld manually operated initiating control circuits shall operate at more than 150 volts.

In cases of stored energy or alternating-current series-capacitor types of resistance welders, the control panels and any necessary external wiring shall be suitably insulated. Panels using voltages above 600 shall be protected by complete inclosures, and any doors which provide access to such high voltage shall be provided with locks and contacts wired in series with a control circuit (similar to elevator interlocks). Such interlocks or contacts shall be so designed as effectively to short circuit or discharge all condensers when such door is open.

A manually operated switch should be installed in addition to the mechanical interlocks or contacts, as an additional safety measure assuring absolute discharge of all condensers.

Press Welders. All chains, gears and belts shall be guarded in accordance with American Standard Safety Code for Mechanical Power-Transmission Apparatus, B15-1927 (or the latest revision thereof). Any press welder operation where there is a possibility of the operator's fingers being under the point of operation should be guarded, where possible, similar to any punch press operation.

Portable Welders. All non-current-carrying metal parts of portable welders shall be electrically grounded. A counterbalanced device shall be used for supporting the gun, including the cables, where the weight to be lifted is more than 40 lb.

Flash-Welding Equipment. When flash-welding machines are used, suitable methods of controlling flash and fumes shall be provided, such as a shield or hood, and a ventilating system should be installed to carry off the metallic dust and oil fumes.

For the protection of operators of nearby equipment, non-combustible curtains or shields should be set up around the machine in such a manner that the operator's movements are not hampered.

The standard states specifically that ventilation and health protection are required for flash welding, but not for other resistance welding operations. In fact, the committee acknowledged that ventilation requirements received considerable attention, that certain fundamentals may warrant further investigation and eventual revision of the standard. The present standard therefore sets forth ventilation and health-protection matters in a broad way, and with the emphasis upon arc and gas welding operations. But from analysis of the standard it appears that the following aspects of fume concentration and ventilation should receive attention in connection with installations of flash-welding machines.

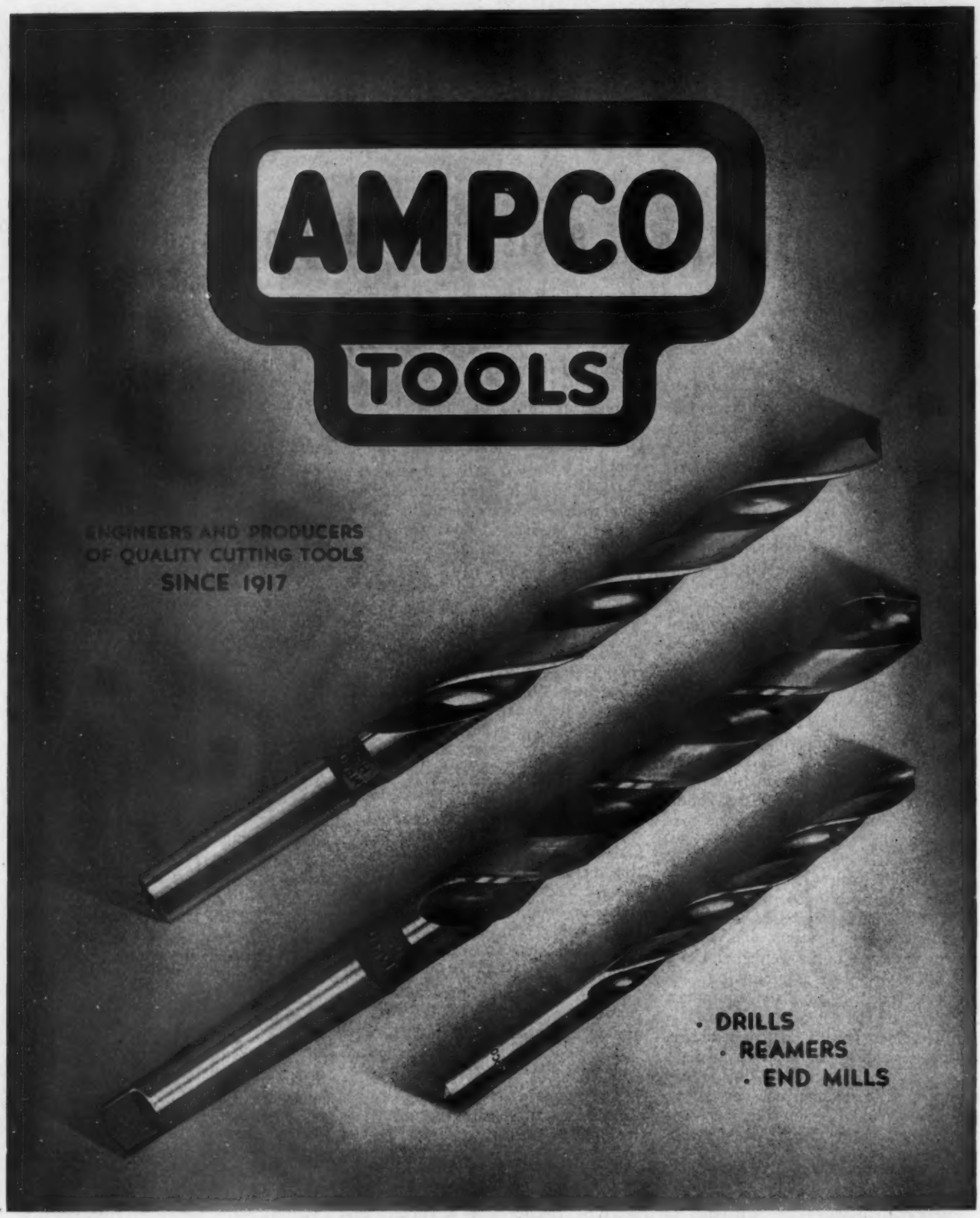
Where welding is performed in confined areas, local or general ventilation systems shall be provided and arranged, sufficient to keep the amount of toxic fumes or dust below the maximum allowable concentration as defined by the American Standard Allowable Concentrations, Z37. In the absence of such a standard concentration, the limits shall be set by the proper administrative authority.

In shops of 50,000 cu. ft. or over, positive ventilation is not required for protection of operators on ferrous metals, providing: (1) welding bays are not structurally blocked, thereby obstructing cross-ventilation, (2) a space allowance of 10,000 cu. ft. is assured each operator. If the number of operators exceeds the foregoing per capita space allowance, the following shall be required: a fan or other positive ventilation device to insure fume dilution and general shop ventilation at a minimum rate of 350 cfm. per operator or a minimum of three air changes per hour. If the shop contains less than 50,000 cu. ft. but more than 5000 cu. ft., installation of wall or roof fans is required, or other positive ventilation device, to insure fume dilution and general shop ventilation at a minimum rate of 350 cfm., or a minimum of four air changes per hour.

Hazards and Precautions. It is recommended that a careful job-analysis be made of the operations to be performed on each welding machine to determine the safeguards and personal protective equipment necessary.

Shield Guards. The hazard of flying sparks should be eliminated by installing shield guards of safety glass or cellulose acetate. All operators and attendants of resistance-welding equipment shall use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as indicated.

Maintenance. All adjustments and repairs to resistance-welding equipment shall be made only by competent persons.



AMPCO TWIST DRILL CO.
JACKSON, MICHIGAN U. S. A.
CHICAGO . DETROIT . CLEVELAND . PHILADELPHIA
Distributors in All Principal Cities

Gaging Business

1944 Output Up 14 Percent

War production for the entire year of 1944 is expected to come to some $65,000,000,000, although it will be about two percent behind schedule. But this will represent a 14 percent gain over the 1943 output of $57,000,000,000. Of the current gross national product amount to $197,000,000,000 annually, 45 percent represents war expenditures including munitions output, while the remaining 45 percent represents non-war expenditures.

Munitons output in August was three percent behind schedule at $5,430,000,000, but was a gain over July's $5,300,000,000. To meet schedules, output must hit $5,900,000,000 monthly by December. In August, heavy duty tires, heavy trucks, heavy artillery, and super-bombers set new records, but were still behind high schedules. Improvement in the manpower situation was credited with accounting for the gains in critical items. August plane production at 7,939 was six percent below schedule, with the lag attributed to changes in the government's method of acceptance.

Strikes Also Set Record

Another record was set in August: 485 strikes, top August figure for the last five years. The strikes involved 190,000 workers and resulted in 935,000 idle man-days, as against 145,000 workers in July taking off 680,000 man-days for strikes. This strike situation is belittled by the Bureau of Labor Statistics, which points out that the time lost in August strikes only represented 12-100ths of one percent of the total available working time. A more effective measure is believed to be the amounts of war materials not produced as a result of strikes.

Situation May Worsen

Some observers believe the situation may worsen in coming months. Major concern centers about the Little Steel wage case. If the steel workers win an increase, and this now appears likely, then all unions will demand a similar raise. John L. Lewis has warned coal operators to be prepared to match whatever increase is granted the steel workers.

Management's ability to meet any increase granted the steel workers will in many cases depend upon OPA's promptness in granting price adjustments wherever they are needed. However, OPA seems to be indicating that it will shy at granting price relief, so long as a company remains in the black no matter how small its profits may be after further wage increases. This seems to be indicated by the OPA's widely criticized study of the Little Steel wage case where profits were considered "before taxes."

Peace Estimates Lengthen

Government spokesmen who had been predicting an early end to the European War suddenly took a longer-term view in late September.

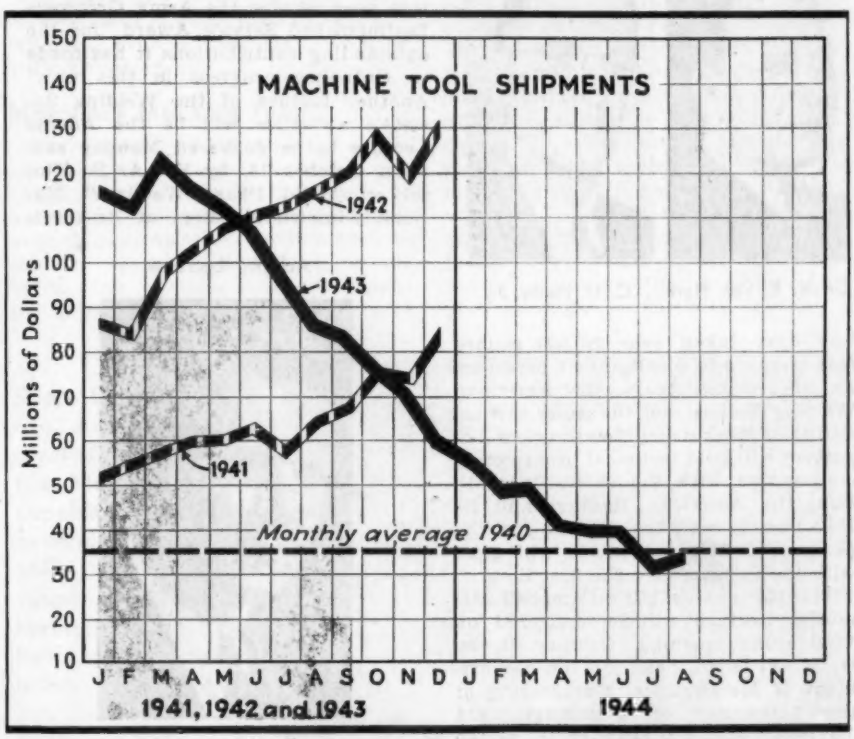
But if the war had ended in September, business would have been in a bad way in view of Washington's lack of preparedness for this eventuality. Business realizes that WPB is still trying to formulate its V-Day plans.

The longer the end of the European War is delayed, the more likely it is that munitions cut-backs will ease the general materials situation before V-Day. Successive reductions in various programs have permitted the release of additional aluminum and steel for special civilian goods programs. Since a further easing is indicated, more "spot" authorizations will be granted by the government as materials become available.

Tool Labor Is Short

Machine tool producers have watched their manpower dwindle away for many months. Since the volume of business was declining, the steady reduction in its work force was not too serious. After all, monthly output was intentionally being reduced in line with incoming orders. But suddenly the situation reversed itself in August, when new tool business jumped $6,000,000.

Tool producers were unable to bring shipments up to new orders. Moreover, the auto industry was asking for early delivery promises. Since the tool builders must first turn out the rated orders on their books, the only way they can promise auto people early delivery would be to increase their labor force and step up shipments. Accordingly, the industry has asked the government for help on deferments for workers, and has appealed to the War Manpower Commission for labor referrals. The auto industry has joined in with this effort, by pointing out that if delivery of new tools to the industry is delayed, such delays will only extend unemployment.



Orders and Shipments Rise—Incoming machine tool orders for August, $42,376,000, were up 17.8 percent over July's $35,959,000. August shipments at $35,041,000 were up 7 percent over July total of $32,753,000. At August-end, backlog was $195,818,000, as against $191,295,000 a month earlier. August cancellations totaled $2,352,000, compared to July's cancellations of $4,070,000

Expanded Metal Congress to Feature Forum Discussions

More than 200 research developments to be discussed; exhibits to cover machines, processes and products of metal producing, fabricating and treatment fields

CLEVELAND—Twenty forum discussions among leading executives, engineers and production men concerning today's problems and operations will headline activities during the 26th National Metal Congress and War Conference Display, sponsored by the American Society for Metals, to be held in the Public Auditorium here from October 16 to 20, inclusive. These meetings will be held each afternoon and evening, except Thursday evening, and will feature 153 discussion leaders on such subjects as inspection and gaging, heat treating problems, steel, gray iron castings, aluminum and tin alloys, metal powders, surface finishes, and surface peening.

The 1944 Metal Congress will be the largest in the history of the event, according to managing director William H. Eisenman. Some 370 exhibi-

A.S.M. Officers-Elect

Dr. K. R. Van Horn C. H. Herty, Jr.

tors have taken over 160,000 square feet of space to display their products. As in previous years, the American Welding Society and the American Institute of Mining and Metallurgical Engineers will hold technical programs in conjunction with the show. In addition, the American Radium and X-Ray Society and the Society for Experimental Stress Analysis will meet with the Congress for the first time.

The Edward de Mille Campbell Memorial Lecture will be delivered on Wednesday morning, October 18, by G. R. Fitterer, head of the Department of Metallurgical Engineering of the University of Pittsburgh. On Thursday evening, October 19, at the American Society for Metals dinner, presided by Dr. M. A. Grossman, president, the A.S.M. Medal for the Advancement of Research will be presented to Robert C. Stanley, chairman and president of The International Nickel Company of Canada, Ltd., for his sponsorship of metallurgical developments. Other awards will also be made at the dinner.

Over 200 research developments will be discussed by the five societies, and 42 technical papers will be presented at twelve A.S.M. meetings. About 60 papers will be presented at the American Welding Society sessions.

The exhibit will run daily at the Cleveland Public Auditorium from noon until 10:30 each evening, except Thursday when it will close at six o'clock. It will feature machines, processes and products covering the entire field of metal producing, fabrication, treatment and application. Tools of all types will be on display, including tungsten carbide cutters, abrasive cutting machines, diamond tools, electric drills, and other items. Heat treating furnaces, induction heating equipment, handling equipment, measuring and testing devices, and quenching oils will be displayed.

To Receive Ordnance Honor

The American Welding Society will this year receive the Army Ordnance Distinguished Service Award "for the outstanding contributions it has made to Ordnance progress in this war." Another feature of the Welding Society's activities will be the Adams Lecture to be delivered Monday evening, October 16, by Dr. A. B. Kinzel on "Solid Phase Welding." Nationally-known speakers at its meet-

Adams Lecturer

Dr. A. B. Kinzel

ings will include Admiral H. L. Vickery, Colonel S. B. Ritchie and Mr. W. B. Stout. Guest speakers at the American Society for Metals meetings will include Captain T. A. Solberg, USN, Maj. Gen. G. M. Barnes, chief, Army Ordnance Research and Development Service, and Lt. Col. Wm. Walter Phelps, AAF Materiel Command.

New officers for the American Society of Metals will be installed with Dr. Kent R. Van Horn, research metallurgist, Aluminum Company of America, scheduled for the presidency, and Mr. Charles H. Herty, Jr., assistant to the vice president, Bethlehem Steel Company, scheduled for the vice presidency, while Mr. Eisenman will continue as secretary.

To Head Welding Society

A. C. Weigel Isaac Harter

Two new trustees, elected to serve for two years, are Lewis S. Bergen, associate director of metallurgy and research, Crucible Steel Co. of America, and Robert W. Schlumpf, metallurgical engineer, Hughes Tool Co. Arthur E. Focke, research metallurgist, Diamond Chain & Manufacturing Co., will serve out the remainder of the term of Dr. Herty as trustee.

The new president of the American Welding Society will be A. C. Weigel, while new vice president will be Isaac Harter, of Babcock & Wilcox. The Society's Lincoln Gold Medal Award will be presented to W. F. Hess, Rensellaer Polytechnic Institute, and D. C. Herrschaft, formerly of Rensellaer and now with the armed services. Both men will also receive the Resistance Welders Manufacturers Association's university group award. The Resistance Welders Manufacturers Association's industrial group award will go to R. B. Bland and P. E. Sandorff, of Lockheed Aviation Corp. The Samuel Wylie Miller Memorial Award will be made to F. T. Llewellyn, consulting engineer.

Semi-Annual ASTE Meeting

DETROIT—The American Society of Tool Engineers will hold its twelfth semi-annual meeting at Hotel Syracuse, Syracuse, New York, Oct. 12 to 14, 1944.

Morning, afternoon and evening sessions will be devoted, in the order given, to: Production Control and Costs, Magnesium, Operating a Branch Plant in Canada, Tooling Instrument Work for Factory Production, Tool Engineering Education and the semi-annual banquet.

Inside Detroit

Criticism Was Sharp

Toward the end of last month, reconversion furore reached a new peak and then leveled off abruptly, climaxing months of mounting impatience with what the automotive industry considered inexcusable governmental agency bungling, buck-passing, and delay. George Romney's unsparing speech before the National Industrial Conference Board left in its wake a score of controversies which have not yet entirely subsided but which are gradually losing importance in the face of a growing belief here that Germany's collapse may *not* be "just around the corner" after all.

The stiffening of enemy resistance on the German border is lending increased significance to the WPB slogan "Less worry about next year's automobile and more about this year's war." That is, in essence, the only rebuttal offered by governmental agencies to Romney's piercing criticism.

Says Would Cut Tape

Only Edward Cushman, Michigan WMC director, actually made a statement, reiterating, in effect, the WPB slogan and contending that, contrary to Romney's statement, the WMC had come to the September 14 meeting with every intention of relieving the industry of as much red tape as possible under the circumstances. He also went on to add that recent conferences called by WMC and WPB in Cleveland disprove Romney's assertion that the WMC policy does not meet the problem of manpower for machine tool production.

However, on the chief issues brought up by Romney—predetermination of scrap, surplus property disposal (parts and machinery), plant clearance, and machine tool production—governmental agencies maintained a dignified silence, some intimating that it was not their habit to foster or engage in inter-agency disputes in time of crisis. Judging by the weight of documentary evidence in the files of the Automotive Council, there could be no disputing the fact that the handling of the Clayton machine tool pricing formula (at least) was too badly botched to be talked about.

Believed a Ruse

There is a feeling here, however, that at least part of the clamor from the automotive industry is merely an insurance policy to protect it from public censure if the worst should happen on the score of unpreparedness for reconversion. Countless tiny threads of intangible evidence suggest that the reconversion plight of the automotive companies is not worrying their respective managements as much as they would have it worry others.

There is already a resurgence of the peacetime competitive spirit in the secrecy enshrouding action of various companies following the obtaining of permission to turn a limited number of specialists to reconversion.

Mr. Christopher of Packard, more forthright than most of his compeers, admitted that his company had no trouble in finding an adequate number of specialists "automatically available for the work of converting back to peacetime production" (i.e. work permitted as of the WMC meeting, September 14). They are being put on this work, he added, "as fast as supervision can give detailed instruction."

More Will Meet the Eye

Apparently the phrase "minor appearance changes" will be stretched to cover a multitude of complete transfigurations so that it is confidently expected in some circles that the 1945 models, which are supposed to be "not essentially different from those of 1942", will at least *look* three years removed—even if it all has to be done with grill-work.

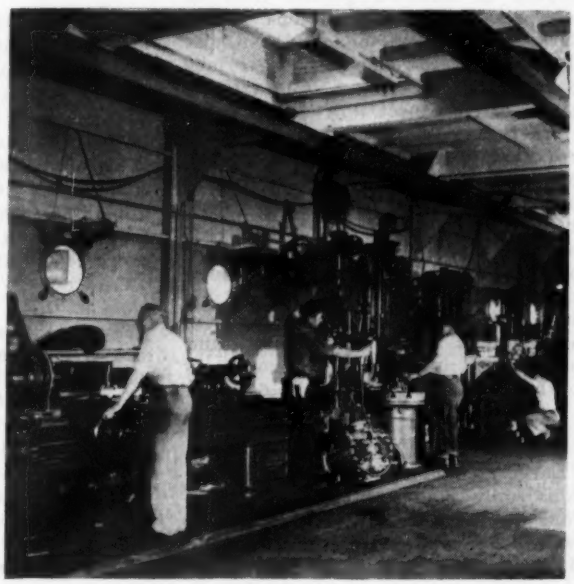
May Lack Machine Tools

There is very little positive assurance for the present that needed machine tools will be in the hands of automotive users in time for an immediate resumption of civilian producton on "go-day". According to the WPB, the average company needs 300 to 400 machines, 60 to 80 percent of which can be supplied from WPB lists. Machinery on these lists, however, will not be available until it is declared "surplus" by the contracting agency. Because of the shifting needs of war production, no one can tell when any specific machine will be declared surplus. That means no company can depend on a machine for its production line.

But, on the other hand, it is perfectly conceivable that this unknown factor may be just enough to fill the breach on "go-day". Following the inevitable flock of terminations after the collapse of Germany, "idle" machines may be an ideal stopgap in the early production efforts of some resourceful automobile companies. With or without transfer of ownership—in some instances, perhaps, with "permission to use until and unless the exigencies of war (with Japan) demand its return"—machinery could be apportioned equitably and practically in accordance with specific needs.

Would Outline Needs

It has been suggested in certain industrial circles here that the value of any such scheme would be greatly enhanced if the owning agencies would draw up a preliminary estimate of the machines they would *probably* need for production against Japan—making allowances for all foreseeable and envisionable shifts in their needs—and then actually *tag* machinery in the category embraced by the estimate. This would at least let automotive manufacturers with an eye on government machine tools know in advance what they could *not* hope to get after Germany's collapse. If, after that, manufacturers themselves were allowed to tag remaining machinery and thus reserve it for their own future use—pending some sort of adjustment of claims by an apportionment committee—the machine tool problem might be partially licked.



Shop Ship—A floating machine shop created by Zalud Mobile Marine Corp., is capable of handling all general ship repairs while moored beside vessels in New York harbor. Removable skylights permit lowering heavy pieces directly into the shop. Chain hoists on trolley ways carry heavy parts or machines anywhere within the 3,000 sq. ft. working floor

Announce Government Plan to Allay "Unemployment Hysteria"

Publicity will explain reasons for cut-backs; wage increases granted to ease foundry labor shortage; union protests Navy "reign of terror"

CLEVELAND—Reduction of war production coincident with the conclusion of the war in Europe will be accompanied by a government publicity campaign designed to allay "unemployment hysteria" in affected communities. The plan, revealed here by Percy D. Fahenstock, chief of the reconversion information division of the Office of War Information, is designed to disclose to workers concerned the full details of contract termination, its extent and the reasons behind it, then to have representatives of the U. S. Employment Service on hand to refer laid-off workers to other jobs.

Purpose of the program is to avoid distorted and damaging rumors of the extent of unemployment, and thus to avoid any rush of workers from remaining war industries into jobs deemed to offer postwar security. Approved by James F. Byrnes, director of the Office of War Mobilization, the procedure disclosed by Fahnestock, includes a report, when cutbacks are impending, by the procurement agency involved to the Production Executive Committee in Washington.

In cases of less than 100 percent termination, this committee will determine, on a basis of reconversion speed, labor supply and excellence of product, which plants should be retained on war work.

Affected Employees Informed

Supplied with this decision, regional offices of the War Production Board will prepare a statement on local implications, and give this first to employees of affected plants, then to newspapers and radio stations. USES clerks will be on hand at cutback plants to refer workers to other jobs in the city or region. No dearth of these is in prospect.

Previous estimates of a 40 percent reduction in purchases by the ground forces, upon the defeat of the Nazis, have been increased to 50 percent, but there is expected to be a continued heavy demand for steel for landing mats for the Air Forces, for bridge construction by the Engineers, and for sheet piling. Heavy-duty trucks, tires, large-caliber guns, ammunition and bombs, all important in the contracts in this area, will still be in demand.

Few Spot Authorizations

Largely on manpower considerations, only eight of the 85 applications to increase civilian production have been granted in the Cleveland district. These "spot" authorizations are for the manufacture of water heaters, cooking utensils, garment hangers, vacuum cleaners, furniture springs and molding clips for auto running boards.

Figures of the Cleveland Ordnance District show that settlement of terminated contracts is being achieved without the protracted delays that some had feared. As of Sept. 15, contracts terminated numbered 642, totaling $815,557,672. Of these, 579, or 89%, have been settled. The cancelled portion of the total, $350,369,998, resulted in claims of $16,484,279, and these were settled for $10,086,998, or about 61%. Major difficulty in reaching prompt settlement is delay in submitting inventories of raw materials and work in process.

Foundry Wages Raised

CHICAGO—To help crack the manpower bottleneck in foundries, the Sixth Regional War Labor Board here is setting up new stabilized wage rates to increase the pay for midwestern foundry workers. The action is the result of National War Labor Board instructions to regional offices to determine whether low pay is the reason why government recruiting drives failed to attract men to the foundries, whose castings are required in critical war items.

The new stabilized rates do not mean automatic increases, the regional board pointed out. The NWLB must still approve voluntary applications for increases up to the new stabilized rates, and these new rates will also be considered by the board in deciding disputed cases.

At Chicago hearings, the unions told the regional board that wages are the real bottleneck in the foundry manpower situation, since other industries offered more attractive pay to the foundry workers. The unions contended that foundries paid higher wages a year ago, but wages were cut before the war and then frozen at the lower levels. In rebuttal, foundrymen produced reams of statistics to support their contention that their wage scales compare favorably with other industries. They contended that higher wages would not end the labor shortage.

Union Protests Navy Rules

SAN FRANCISCO—Alleging that administration of the 104 government-seized machine shops of this area by naval authorities has been a "reign of terror," suits have been filed in Federal District Court to test the validity of the sanctions imposed on workers who have failed to obey rules established by government officials. The suits were filed by the AFL Machinists Union, and an individual member of the union against whom penalties had been imposed.

Workers refusing to work the "over 48-hour" week that naval authorities established for the seized shops faced discharge, refusal of clearances and job referral privileges.

War Department Develops Plan To Sell Government Machine Tools

WASHINGTON — The War Department is now proceeding with a formal plan to sell government-owned tools to contractors, regardless of whether or not such tools are still required in war work. The plan has the concurrence of the Surplus War Property Administrator and stipulates that tools sold to plants in possession of them be used for war work as required until the end of the war.

Contractors, with War Department tools in their plants, desiring to purchase such tools should contact the local Army Procurement establishment having jurisdiction over the equipment. Subcontractors have the same right provided that existing contracts do not forbid the exercise of such rights.

The War Department recently circulated facilities questionnaires among contractors in possession of War Department owned tools, and asked them to indicate which tools they were desirous of purchasing. Accordingly, the chiefs of Army technical services will be held responsible for initiating sales negotiations with the interested contractors, as indicated by the questionnaires.

Sales will be made at prices based upon the Price Policy set by the Surplus War Property Administrator (AMERICAN MACHINIST, Aug. 3, 1944, p. 124b). Sales prices will be f.o.b. the buyer's plant, and the original price of special tooling sold with the tool will be included on the same basis. The period of active use of the machine for computing the sale price will be calculated from the estimated date the tool was originally put in use until the date of sale, if the tool is still in use at that time. If the tool is idle at time of sale, then the use period is calculated to the time the tool became idle.

Wartime Washington

WPB's Reconversion Plans

WPB ructions over V-Day plans center on whether or not controls should be gradually removed or taken off all at once and over industry-wide plans regarding reconversion. WPB still has two schools of thought on reconversion, one of which would like to set up quotas and mete out a specific share of planned production to major industries, such as the auto group, while the other theory is that at removal of controls all manufacturers should "go to it" and produce as much as they can of their normal product. These major issues will have to be settled before V-Day unless widespread confusion is to prevail.

Meanwhile, WPB has announced plans to remove 350 out of 500 existing controls on the day the war with Germany ends, and to simplify the remaining 150 orders. The orders to be removed would virtually end WPB control over metal products and other durable goods, while 100 of the orders to be maintained would pertain to chemicals, textiles, leather, cordage and other critical materials. Other orders would probably be applicable to critical components.

Two Ratings Remain

The present rating system would be replaced by two ratings, an MM rating for direct military requirements and lend-lease, and a AAA rating to break military production bottlenecks. On V-Day, metal producers and warehouses could make deliveries of steel, copper, and aluminum without CMP allotments, but they will have to give preference to CMP allotments on the books on V-Day.

Certain basic regulations will remain in effect to leave WPB with power to increase controls or take appropriate action wherever necessary. One such regulation is Priority Regulation Number One, which establishes the preferential treatment that industry must give to rated orders. Another important key control will be the CMP 60-day inventory limitation, which would prevent overbuying by reconverting industries. Other allocating and scheduling controls will be maintained to maintain WPB's authority to step in when required to break bottlenecks or relieve distressed situations.

Nelson Stays In Washington

This plan was announced by Julius A. Krug, as his first official act as Chairman of the War Production Board. Nelson's expected resignation was almost on schedule, coming only a few days after his return from China. Some of Nelson's assistants in WPB are reported to be working on analyzing the economic data on China, which Nelson brought back with him. Since Nelson is reported to have personal reasons for remaining in Washington, he has agreed to remain in government service at the request of President Roosevelt. At last four major posts are rumored to be lined up for him. One of these would be the job of heading up a new reconversion agency, while another would tie him in with surplus disposal. But it is possible that Nelson may be used to help the State Department develop foreign trade programs, which are badly lacking at this time.

Nelson's resignation was followed by that of Donald D. Davis, WPB vice-chairman in charge of field operations, which brought to three the number of resigning WPB chairmen since the Nelson-Wilson flare-up. The previous two resignees were L. R. Bouleware and Sidney J. Weinberg.

"WHEREAS" AND WHERE AT

WASHINGTON—In a speech before business publishers here, Mr. Maury Maverick, Chairman, Smaller War Plants Corporation, ridiculed some of the legal wording of certain government regulations. Mr. Maverick said, "After a manufacturer finishes reading some dozen whereases in one of those forms, he doesn't know where he's at."

Water, Mud or Land—Designed specifically for use in swamp warfare, the new M-29C "Water Weasel," a light-weight amphibious cargo carrier, is now in production by Studebaker. It is equally at home in water or quagmire or on the land and easily make the transition from one to the other

Associated Press

OPA on Steel Wages

With the steel wage controversy soon to be dumped into the President's lap, the OPA got itself on a "hot spot," when one of its economists apparently released an "unofficial" study which the agency was making of the Steel Wage case. Based upon U. S. Steel's figures alone, the OPA's study concluded that steel workers could get the entire 17-cents-an-hour wage increase without creating a need for higher steel prices. OPA added that granting the full wage demand would largely be offset so far as average hourly earnings are concerned "by disappearance of overtime and the reversal of the labor upgrading process." Apparently, OPA contemplated that the wage increase would be timed to the end of the war in Europe, since overtime will not "disappear" nor will the labor upgrading process "be reversed" until the German war ends.

It is speculated that release of the OPA report was calculated to influence the decision of the War Labor Board, although WLB refused to admit the report in its hearings. In any event, the OPA report was based on earnings "before taxes," with OPA apparently dismissing the necessity for steel companies to make enough profits to pay small dividends to stockholders. Just how this will encourage industry after the war was not pointed out. The OPA contention that Big Steel's situation was representative of the entire steel industry, brought forth from people who know the steel industry the single response, "Oh, brother!"

Public Pays Wage Rise

In the final analysis, about 80 percent of the wage increase demanded by the steel workers would come out of taxes that might otherwise be paid to the government. A small part of this would be repaid by slightly higher tax collections from the steel workers, but the bulk of the loss in Federal revenue would come out of the pockets of all the American people.

Spotting the Air News

See Wide Turbine Use Soon

Jet and gas turbine aircraft power plant design is making phenomenal progress. Basic principles have come up from almost nothing during the past three years, to a point where the best authorities predict an early revolution in aircraft prime movers. One such authority, a topside executive in the air war program, speaking off the record to this writer and several others, says that turbine engines will be extensively displacing reciprocating engines within five or six years.

This change will have an important effect upon the metal-working industry. In 1938 the aircraft engine industry built nearly 8,000 units having a value of about $100,000,000. (Present astronomical engine statistics: 227,000 units in 1943, valued at more than three billion dollars, are of little future significance.) Forecasts put the aircraft industry: airframes, engines, propellers—back to a fraction of present output, varying between three and ten percent. Regardless of that, all agree that the industry will be bigger than it was before the war. That will be true of engines, and one may assume an early postwar output of 10,000 units or more.

Jets Simpler to Make

Reciprocating gasoline engines have thousands of parts, most of them finely machined, many of them finished to very close tolerances. Produced in many models, relatively few of each—as they will be for awhile—they will require a great expenditure of manhours, and many machine and hand tools. Jet-turbine engines, on the other hand, have but one major moving part—the rotor itself. As presently designed, it has only two rubbing surfaces: the two main rotor bearings. Those are the only close machining jobs on it. Stresses on most of the metals used in jet-turbines will be much less than in reciprocating types.

The jet-turbine engine will require so much less machining, so much less manpower, so much less skill, that the industry is bound to experience a progressive and sizeable drop in dollar value per horsepower as the transition moves along. In fact, some competent authorities have expressed opinion that the high-quality personnel and facilities now producing engines may find they cannot afford the shift to the cheaper jet product. It is suggested that they may want to employ their people and plans in making other precision machines, tools, and instruments.

May Combine Jet, Turbine

Briefly, the jet engine is a long cylinder, taking air and fuel in at the front, compressing it, exploding or burning it, passing the expanded air and gas back through a turbine (which drives the compressor) and finally discharging it as a jet, creating forward thrust. The unit can put most of its fuel energy into the jet, or most of it into the turbine, or into both in different ratios. This ratio can be fixed, or variable in flight. Engines developing a portion of their useful power on the rotor, of course, will have a shaft and a propeller. Since the jet is inefficient at low speed, most of the fuel energy can be applied to the propeller for take off, and at high altitude the propeller can be feathered and all energy put into the jet. If propeller efficiency requires reduction gears, that will add much to the intricacy of the engine.

Jet-turbine engines already have been cut down to half the weight of reciprocating units of equivalent power. They have attained speeds in excess of 500 m.p.h. Units of 5,000 h.p. appear to be feasible soon.

TELL RECONVERSION IDEAS

DETROIT — Top auto executives in a recent press conference offered several possible substitutes to present reconversion planning after the fall of Germany. K. P. Keller, president, Chrysler Corporation, suggests "why not maintain 100 percent war production after V-Day on items to be used against Japan, and build up an equipment bank, after which whole plants could be reconverted. In other words, why not do most of the Japanese war production at top speed for a few months, instead of three times as long at one-third speed?" Mr. Keller points out that a 35 percent cut in war production would not mean a corresponding degree of reconversion in the auto industry.

C. E. Wilson, president, General Motors Corporation, suggested that the government should give priorities to the auto industry, and similar industries requiring considerable plant rearrangement for reconversion, to enable them to acquire the necessary equipment as soon as needed. If this is not done, stated Mr. Wilson, then widespread unemployment may attend reconversion delays.

Canadian Reconversion Plan Well Along; Some Items Still Tight

OTTAWA—Canadian plans will be free of war controls much sooner than their counterparts in the United States. The bulk of Canada's war production effort will finish when the Hitler war is over. Output will be cut back upwards of 50 percent. V-E Day will see the shedding of controls and restrictions on the supply and use of nearly all materials, also those on transportation and other services. Minister C. D. Howe's Munitions and Supply Department will retain priority rights over materials required for production for the war in Asia and a few materials, such as tin, which will remain scarce for a long time, will continue under restrictions. In the main, industrial plants will be free agents, at liberty to buy materials and equipment where they are available and to use them for whatever purposes they wish.

Drop Controls on V-Day

Industry is being told in advance that it will be free as soon as fighting stops in Europe. With the dropping of parent controls administered by War Industries Control Board of Munitions and Supply Department, the civilian control agency, Wartime Prices and Trade Board, will abandon practically all its controls on the output of consumer goods, including those imposing standardization and simplification practices. A list of over 40 WPTB restrictive and prohibitory decrees on the manufacture of civilian metal products was washed out in September. This action removed prohibitions, restrictions, or standardization requirements from heating, plumbing and air conditioning equipment, furniture, machine screws, small electrical appliances, cast iron and enamel ware, elevators, agricultural tools, steel pipe, barbed wire, builders' hardware, burial caskets and many small items.

Neither these recent releases nor those which will follow when Germany quits will enable plants to turn at once to large-scale civilian production. Materials are still tight, especially those for which demand is greatest such as sheet steel and copper tubing. These two are expected to continue tight for some time owing to the requirements of the automobile industry.

Industry is Prepared

But to the extent that they can obtain materials Canadian plants will be ready for the switch-over. Assurance by General Motors of Canada

that it will have new automobiles on the market from 4 to 6 months after it is given the go sign is fairly indicative of the position of metal industries in general. A few industries, aircraft for example, whose war contracts are being heavily cut back in advance of V-E day are likely to be freed entirely from production controls.

Nearly all firms whose production of durable civilian goods such as washing machines, stoves, radios, refrigerators, vacuum cleaners, electrical appliances, will follow the example of the motor car companies in returning to 1942 models when the production ban is lifted. Incorporation of scientific advances resulting from wartime research and experience is not expected to come for at least two years.

War plants reverting to civilian operations will have their labor priorities revised in accordance with the importance of these operations.

Prices Cause Uncertainty

Many firms whose civilian output has been under the ban for two years are worried about prices and profits on new production. Price Control Chief Donald Gordon, with the backing of the government, has determined that anti-inflation barriers must be maintained into the immediate postwar period and has decreed that 1941 base period price ceilings or their equivalents will apply to products returning to market. In many cases wage rates have been adjusted upward since production stopped, and some will have to pay higher prices for components from the United States. They will have difficulty, with these advanced costs, in producing to sell under the ceilings. It is anticipated that Ottawa will give them some relief on components by revoking the 10 percent war exchange tax on imports.

Export Prospects Favorable

New production will be allocated between the domestic and export markets. Substantial demand is developing for goods for export. A backlog of orders for 100,000 tons of steel, largely in rails, is already piled up. To meet it 48,000 tons of steel has been allocated for export requirements in the first quarter. The Czech government in London is negotiating for a big bill of metals under the provision for Canadian credits to foreign governments buying in Canada recently made by parliament. Proposals from Moscow for the purchase of large electrical power development equipment are under consideration.

Equipment shops of Canadian railways are reverting to civilian output, to fill export orders and domestic needs in locomotives and freight, express and passenger cars. But Canadian shipyards appear to have lost the prospect of an order from the Netherlands government for 30 cargo ships for the East Indian trade.

Names in the News

G. C. Paterson

John J. Cronin

George C. Paterson has been named general manufacturing manager and **John J. Cronin,** general industrial relations director of the Fisher Body Div., General Motors Corp. Both men have been associated with the division for many years.

J. Emmett Fink, former general works manager of the Great Lakes Steel Co., Detroit, Mich., has been appointed vice president in charge of operations of the company. At the same time, **Julius A. Clauss,** chief engineer for the company for many years and former WPB official, has been named vice president in charge of engineering. Both men have been in the steel business for many years and with Great Lakes Steel since its formation in 1929.

Craine
J. Emmett Fink

Trinity Court
Julius A. Clauss

W. E. Magnuson has been appointed factory superintendent for Consolidated Vultee Aircraft Corp. at their plant near Downey, Calif. Mr. Magnuson has been in the aircraft industry for eight years—four with Douglas Aircraft Co. and four with Convair, where he has held numerous positions.

W. J. Neisel has been appointed manager of the industrial equipment section of the Pilot International Corp., New York. Mr. Neisel was previously with the American Steel Export Co.

Allis-Chalmers
Fred Mackey

Three new works managers have been appointed in the manufacturing division of the Allis-Chalmers Mfg. Co. Those appointed are: **Hugo W. Leibert,** general works manager of the tractor plants; **Fred S. Mackey,** general works manager of the general machinery plants; and **Harry E. Ladwig,** works manager of the West Allis foundries and pattern shops. All the men have been with the firm for many years and have held numerous positions.

Allis-Chalmers
Hugo W. Liebert

Allis-Chalmers
Harry E. Ladwig

John C. Lee, formerly manager of the Aircraft War Production Council, West Coast, has been elected president of the Menasco Manufacturing Co., makers of landing gear and other aircraft equipment. Mr. Lee, who succeeds John E. Royal, has served as acting general manager of the Aeronautical Chamber of Commerce for the past three months.

Fred Grotts, president of the Fort Pitt Steel Casting Co., subsidiary of H. K. Porter Co., Inc. of Pittsburgh, has also been named director of research and metallurgy for all Porter plants.

J. P. Johnson has been elected executive vice president, and **J. E. Allen,** vice president, of the Aro Equipment Corp., Bryan, Ohio.

A. A. Kucher, director of research of the Bendix Aviation Corp. and chairman of its long range planning committee, has been elected a vice president. Head of the corporation's central research laboratories in Detroit, Mr. Kucher has charge of developing and investigating new product activities.

W. S. Wilbraham

D. S. Harder

William S. Wilbraham, former assistant to the general manager of Lukenweld, Inc., Div. of Lukens Steel Co. has been named production manager of that company. Mr. Wilbraham has been with Lukenweld since 1927 as a member of the sales, cost and production departments.

Delmar S. Harder has resigned as general manager of Fisher Body fabricating plants and the division's wartime supervisor of tank and ordnance development and production. Mr. Harder, whose resignation will become effective with the end of the European phase of the war, has been with Fisher Body for nearly ten years.

Ralph P. Bell, director general of the Aircraft Production Branch of the Department of Munitions and Supply, Canada, has resigned. He left the first of October, but will be available until January 1 for consultation, when his resignation becomes effective. Mr. Bell will return to his former position as president of Pickford & Black, Ltd., Halifax.

J. H. Jewell has been named manager of the Industry Departments of the Westinghouse Electric and Mfg. Co., Pittsburgh. Mr. Jewell has been a member of the Westinghouse organization since 1920 and has been associated largely with the sales division of the company.

BUSINESS ITEMS

Wickwire Spencer Steel Co. has moved its general sales office for the mechanical specialties division from 500 Fifth Ave., New York, to Clinton, Mass.

Simmonds Aerocessories, Inc. will serve as permanent representative and licensee in the United States of **Dowty Equipment, Ltd.,** of Cheltenham, England, manufacturers of hydraulic pumps and equipment.

The National Tube Co. has completed arrangements for the acquisition of the buildings and properties of **Tubular Alloy Steel Corp.,** Gary, Ind., which on Oct. 1 became an operating division of the National Tube Co.

The Lukens Steel Co. has been licensed by **Carnegie-Illinois Steel Corp.,** U. S. Steel subsidiary, to manufacture "Cor-Ten", a corrosion-resisting, high strength low-alloy steel developed by Carnegie-Illinois and previously manufactured only by U. S. Steel subsidiaries.

The Bound Brook Oil-Less Bearing Co., Bound Brook, N. J., has appointed **R. B. Golling,** 120-63 Edgewater Dr., Lakewood, Cleveland, Ohio, as their representative in Ohio, Western New York and Western Pa. **W. K. Swift,** 159 W. Berkley Ave., Lansdowne, Pa., will represent the company in Eastern Pa., Southern, N. J., Md., Del., and Va.

The George Gorton Machine Co., Racine, Wis., has appointed **Russell, Holbrook & Henderson, Inc.,** 292 Madison Ave., New York, as its exclusive representative in the New England territory.

Devenco, Inc. has been formed to render engineering service to industry. The company, under the supervision of **T. J. Kauffeld, J. Q. A. Holloway,** and **J. J. Ryan,** is located at 150 Broadway, New York 7, N. Y.

Kobe, Inc. has moved its California Div. sales offices from the company's general office to a suite of offices at 217 Wilson Bldg., Huntington Park. **W. F. Slater** will continue as division manager.

Luther and Pedersen Agency, recently organized at 565 West Washington Blvd., Chicago 6, Ill., has been appointed direct sales representative for **Davis & Thompson Co.,** Milwaukee, Wis. The organizers of the Agency were formerly with the Monarch Machine Tool Co.

The Ergolyte Manufacturing Co., 3627 N. Lawrence St., Philadelphia, Pa. has purchased the equipment and inventory of the **Precision Engineering Co.,** 4632 Armitage St., Chicago, Ill. **William Dickey,** former owner of the Chicago company has been retained by the Ergolyte Co.

The Long Machinery Co. has changed its name to the **Gamelin Machinery Co.** and has moved its offices to 261 Franklin St., Room 420, Boston, Mass.

E. L. Essley Machinery Co., Chicago, has opened a branch office at 607 Keeler Bldg., Grand Rapids, Mich., with **Harry J. Swanson** in charge.

The H. B. Machine & Tool Co. has moved to a new office with expanded facilities at 7113 Euclid Ave., Cleveland 3, Ohio.

OBITUARIES

Charles W. Beaver, 68, former associate director of research and product development for the Yale & Towne Mfg. Co., died September 23. Mr. Beaver has been with Yale & Towne for 35 years. He resigned in 1925, and later served as president of the Lockwood Manufacturing Co. for two years and then retired from business. He was recalled by Yale & Towne in 1934 to organize the research department and has headed it since then.

Frank B. Plesko, 76, founder and former president of the Acme Tool Co., Cleveland, until his retirement in 1931, died Sept. 27. He was active in the field of mechanics and was known for his inventions.

MEETINGS

American Machine Tool Distributors' Association. Fall meeting. The Homestead. Hot Springs, Va. Nov. 13-14.

American Society of Mechanical Engineers. Annual meeting. Pennsylvania Hotel. New York, N. Y. Nov. 27-Dec. 1.

American Society for Metals. Annual meeting. Hotel Statler. Cleveland, Ohio. Oct. 16-20.

American Society of Tool Engineers. Semi-annual meeting. Hotel Syracuse. Syracuse, N. Y. Oct. 12-14.

American Welding Society. Annual meeting. Hotel Cleveland. Cleveland, Ohio. Oct. 16-19.

Association of Electronic Parts and Equipment Manufacturers. Electronic Parts and Equipment Industry Conference. Stevens Hotel. Chicago, Ill. Oct. 19-21.

National Metal Congress. National Metal Exposition. Public Auditorium. Cleveland, Ohio. Oct. 16-20.

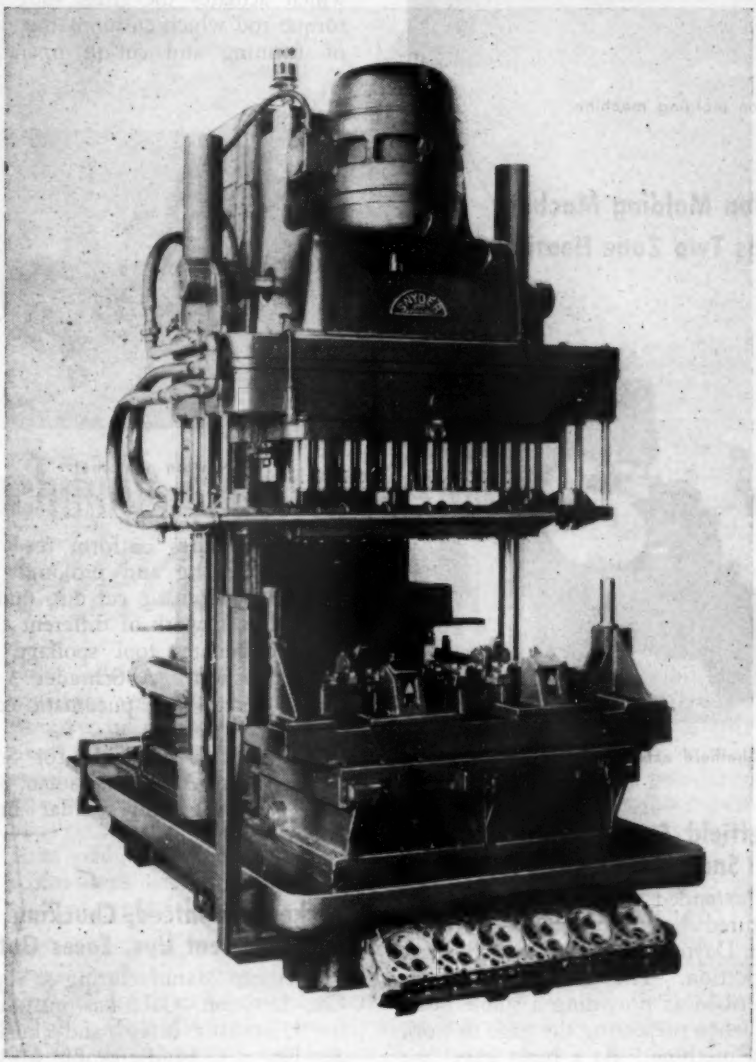
Society of Automotive Engineers. National Fuels & Lubricants Meeting. Hotel Mayo. Tulsa, Okla. Nov. 9-10.

Society of Automotive Engineers. National Air Cargo Meeting. Hotel Knickerbocker. Chicago, Ill. Dec. 4-6.

Society of the Plastic Industry. Fall Meeting. Waldorf-Astoria Hotel. New York. Nov. 13-14.

Shop Equipment News

Automatic Cycle Drilling and Reaming Machine Developed by Snyder Tool Company



Snyder special purpose drilling and reaming machine

A special purpose machine for drilling and reaming 24 holes in an aluminum alloy aircraft cylinder head has been developed by Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, Mich. The machine consists of a Snyder standard 20-V-16 drilling machine column installed upon a special base and using a special multiple head mounting bracket, carrying a 48-spindle multiple drilling head and two 24-hole bushing plates.

Two vertical guide bars are provided extending from the fixture base to the head casting. Rack teeth in these bars engage a pinion cross-shaft and keep both ends of the head moving downward in parallel. Fixture assembly and slide are supported by three ways, the center way being equipped with gibs.

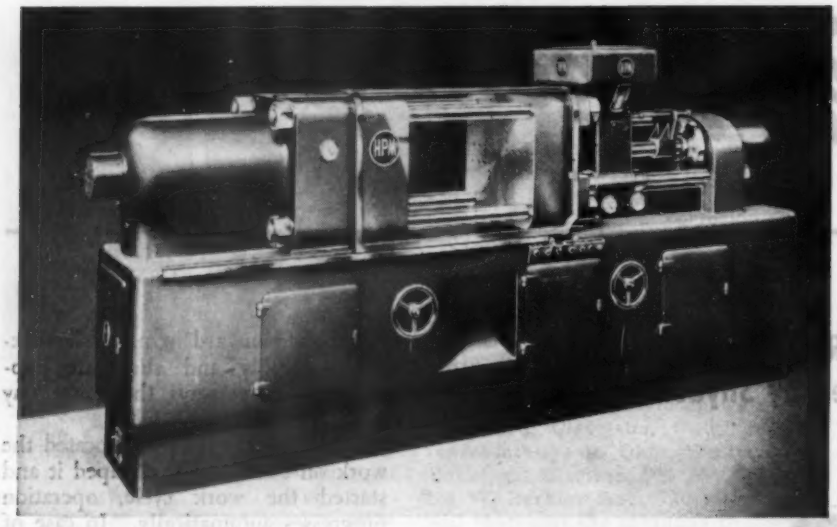
After the operator has located the work on two dowels, clamped it and started the work cycle, operation progresses automatically. In case of tool trouble, an emergency button retracts the tools from the work and the fixture automatically returns to loading position, from either drilling or reaming operation.

Aro Impact Wrench Prevents Burning or Stretching Threads

A new 3/8 in. impact wrench—model 131—that operates with controlled torque is announced by The Aro Equipment Corp., Bryan, Ohio. This pneumatically powered tool, which the manufacturer says completely prevents stretching or burning of threads, is capable of both forward and reverse rotation and has a calibrated adjusting screw on the side of the motor that enables the operator to set any bolt or nut to any desired tension.

Simplicity of design of the roller clutch impacting mechanism insures long life and ease of maintenance. The motor is governor controlled, employing a six-bladed rotor mounted on precision ball bearings and is housed in a sturdy aluminum case. It is only 6¾ in. overall length and weighs 4¼ lb.

Aro impact wrench



HPM sixteen ounce plastic injection molding machine

H.P.M. Sixteen Ounce Capacity Injection Molding Machine for Thermo-Plastic Materials Has Two Zone Heating System

The Hydraulic Press Manufacturing Co,. Mount Gilead, Ohio, announces the completion of a new 16 oz. capacity thermo-plastics materials injection molding machine.

The die head is a solid steel forging, arranged so that it can be moved forward hydraulically, automatically retracted from the nozzle tip or moved until the heating chamber is clear. The stationary head is a U-shaped solid steel plate, acting as a stop for the movable die head, permitting unobstructed clearance for easy removal of heating chamber or nozzle.

The hydraulic injection unit is a double-acting ram working in a smooth bored steel cylinder; the injection chamber is adjustable to accommodate heating chambers of various lengths. The chamber is provided with two zone heating systems, using electric band heaters with Wheelco indicating temperature controls.

Main operating valves are actuated by solenoids. The operator must start each cycle by moving clamp operating lever. Pushbuttons are furnished for start and stop of motor, heat on and off.

Four adjustable knockout rods are provided for operating knockout bars in the mold; provision has been made to locate two additional ones on horizontal center line. All water connections for cooling operating oil, feed chamber and dies are built into the machine; only one water inlet and one drain are required.

Sheffield extended anvil snap gage

Sheffield Extended Anvil Snap Gage Speeds Inspection

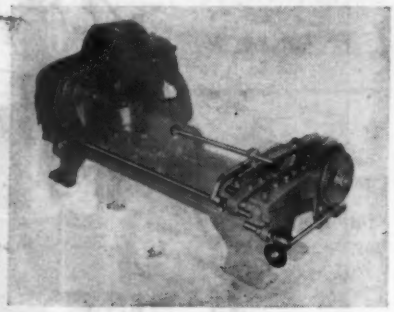
An extended anvil snap gage manufactured by the Sheffield Corporation, Dayton 1, Ohio, is said to speed inspection. The extended anvil is described as providing a stable bearing when presenting the gage to work in a machine. As a hand gage, the extended anvil snap enables inspection to be done quickly, accurately and with less fatigue than the conventional snap gage.

Square type anvils are furnished as standard, while pin type anvils may be supplied on request. Twenty-five standard models cover the range zero to 6.625 in. and also provide the choice of two different height lower anvils. Larger sizes are available on special order.

Newton Automat Converts Bench Lathe to Automatic

Hand-operated turret-equipped bench lathes are said to be quickly converted into reliable automatics by the Newton Automat, now in quantity production by the Newton Manufacturing Co., 706 N. Heliotrope Drive, Los Angeles 27, Calif.

The Newton Automat actuates cross slide, bed turret and chuck; eliminates all manual operations except original setups and cutting tool replacements. It is equipped with a set of standard cams which will handle almost any job. The member which actuates the cross slide is a torque rod which cushions the shock of forming and cut-off operations



Newton Automat

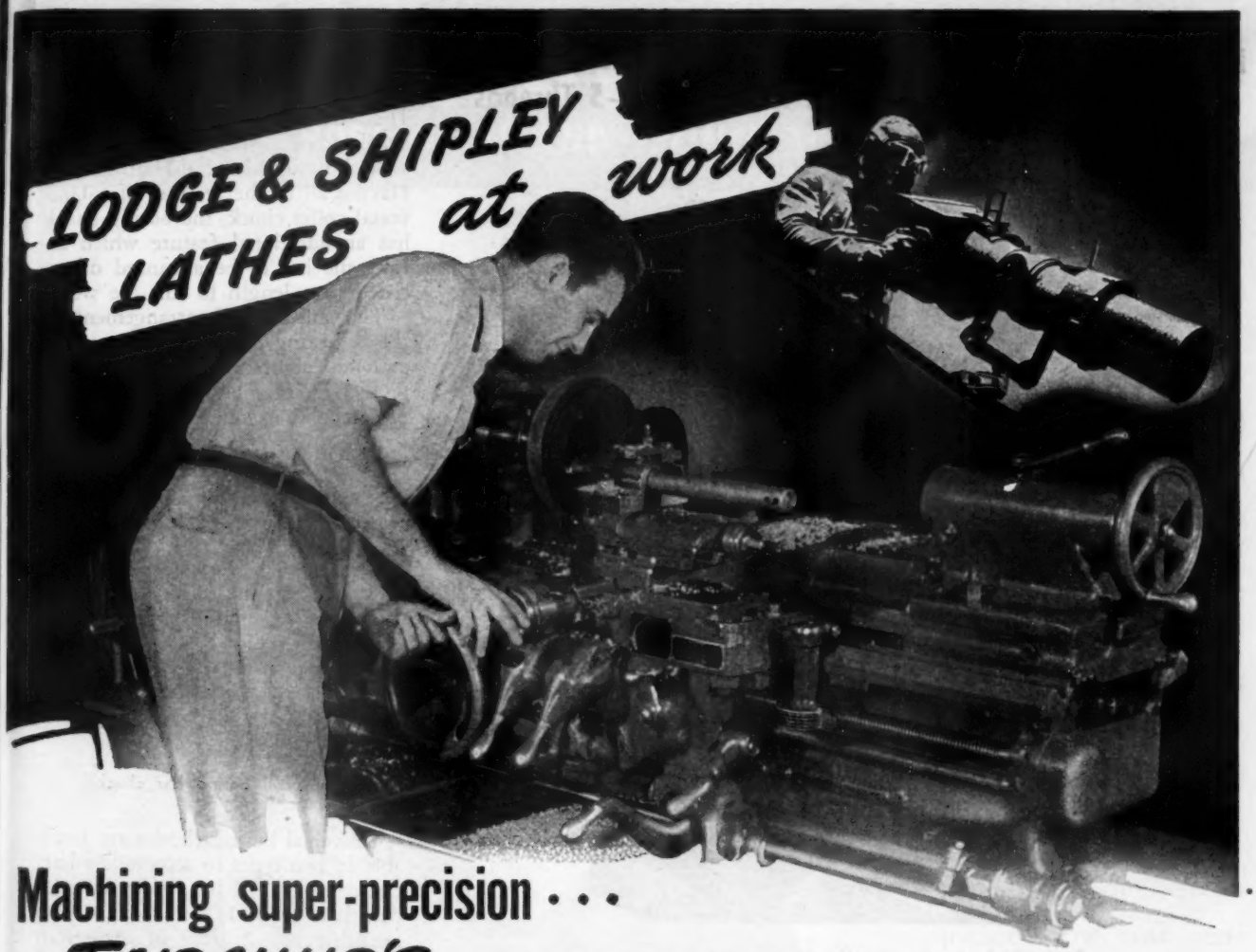
and also assures uniform feed, accurate repeating and prolongs tool life. An automatic cut out, quickly adjustable to work of different character, eliminates tool spoilage and parts rejection. A Schrader 3-way valve operates any pneumatic collet closer.

The unit is available for South Bend, Logan, Atlas, Craftsman, Sheldon, Clausing and similar bench lathes.

Heckethorn Infeed, Chucking Attachment Ups, Eases Output

Heckethorn Manufacturing & Supply Co., Littleton, Col., has introduced the Hecomatic infeed and chucking attachment to handle profile work on a Cincinnati centerless grinder. It is said to do mechanically all the operations a man would do in hand feeding, grinding and ejecting.

A cam-operated arm serves to move the table at the proper speed for fast removal of from 0.006 to 0.008 in. of stock on a piece up to approximately 1 in. dia., using a 60-grit wheel with the machine operating at the rate of 900 pieces per hour.



Machining super-precision . . . IN FAIRCHILD'S "BETWEEN-THE-LENS" AERIAL CAMERA SHUTTER

Fairchild's aerial cameras for military and civilian use are built to operate at temperatures ranging from —70° to +165° F. and at speeds from 1/25 to 1/500 of a second. Because the Fairchild "between-the-lens" shutter is the heart of the camera, it must be machined with superfine precision to insure trouble-free performance under the most extreme conditions, even including aerial combat.

For this and other close-tolerance jobs on Fairchild cameras, Lodge & Shipley's Engine Lathes were selected. One of many vital precision jobs performed by these lathes is that of optically aligning the camera lens with this special shutter.

A beam of light, projected through the lens, goes through the spindle of the lathe onto a darkened screen. Here, through a fixture adjustment, the image is brought to required focus. The operator then finishes inside and outside diameters of the shutter housings to obtain a perfectly centered lens and shutter assembly.

L & S Engine Lathes are also used for boring, facing, and threading camera shutter housings, in many cases to within .0003" tolerance.

Whether your work is standard or highly specialized, it will pay you to consult Lodge & Shipley Engineers. For further details, write for Bulletin No. Bo-503.

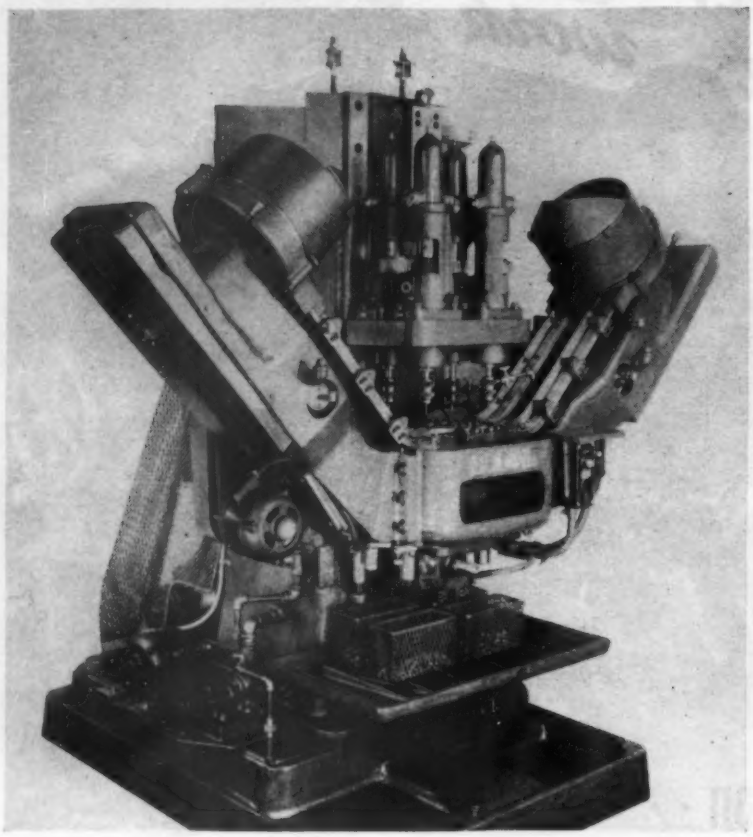
THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

L & S LATHES

ENGINE TOOL ROOM AUTOMATIC OIL COUNTRY LATHES

Bodine Corporation Perfects High Speed Automatic Nut Tapping Machine for Class 3-4-5 Threads



Bodine high speed automatic nut tapping machine

The Bodine Corporation, 315 Mountain Grove St., Bridgeport, Conn., has perfected a fully automatic nut tapping machine which delivers four nuts simultaneously to four tapping stations by means of two hopper feeding mechanisms, each equipped with two adjustable chutes.

One segmental gear drive controls the four spindles through a precision lead screw. Taps are started at slow speed through this control, and when tapping is completed, spindles are reversed at double the spindle speed. The threads on the master screw and its spring-tensioned nut match those of the tap. Screws and nuts are changed when tap pitch is changed.

Four precision-tapped nuts are produced per stroke, each being discharged to its individual collecting box so that the product of each spindle may be individually gaged. Two sizes of nuts may be tapped at one time. Maximum production is 9,000 per hour.

The machine is a completely automatic self-contained unit, and will tap any nut blank that can be hopper fed up to ½ in—13 threads per in. in mild steel or its equivalent.

Jansson Carbide Thread Plug Gages are now Available

A complete line of carbide thread plug gages is announced by the Jansson Gage Co., 19208 Glendale Ave., Detroit 23, Mich. The wear-resisting properties of carbide make possible continued accuracy over longer periods of time and permit more gaging operations to be performed before checking or refinishing of gages is necessary.

Three styles are offered, made to American Gage Design standards. Solid carbide is used for the smaller size gaging members. Larger sizes have a carbide bushing over a steel body. All gaging members are ground from solid carbide.

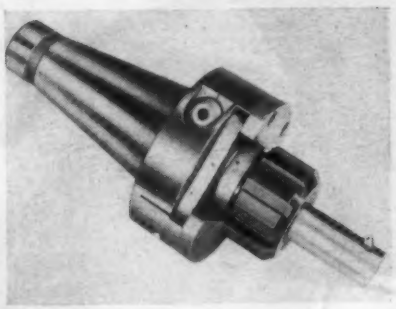
A complete size range is available from 0.112 in. to 3 in., ground to class X or class Y tolerances.

Jansson carbide thread plug gage

Universal Boring Chuck to Hold Boring Bars Available

The Universal Engineering Co., Frankenmuth, Mich., has announced a chuck designed to hold boring bars. Having all of the features of a Universal collet chuck, the boring chuck has an additional feature which allows the bar to be advanced or receded to a length to suit the work.

The anti-backlash arrangement of the adjusting screw is said to give extreme accuracy. Hole sizes to 0.0005 in. may be bored depending on graduations only.

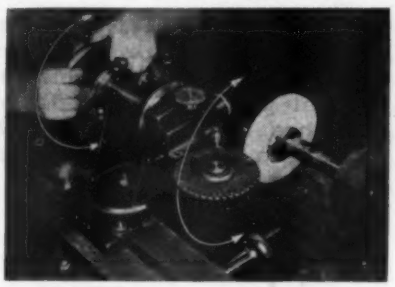


Universal boring bar chuck

Universal boring chucks are available in two types to accomodate bars from 3/8 to 3/4 in. and to accomodate bars from 1/2 to 1 in. Also available are 2 sizes of American standard milling machine taper and 2 sizes of Morse taper.

Hill Machine Co. Announces Radius Grinding Fixture

The Hill radius grinding fixture made by Hill Machine Co., 1032 Mulberry St., Rockford, Ill., is described as capable of grinding arcs up to 180 deg. and certain angular or flat edge surfaces.

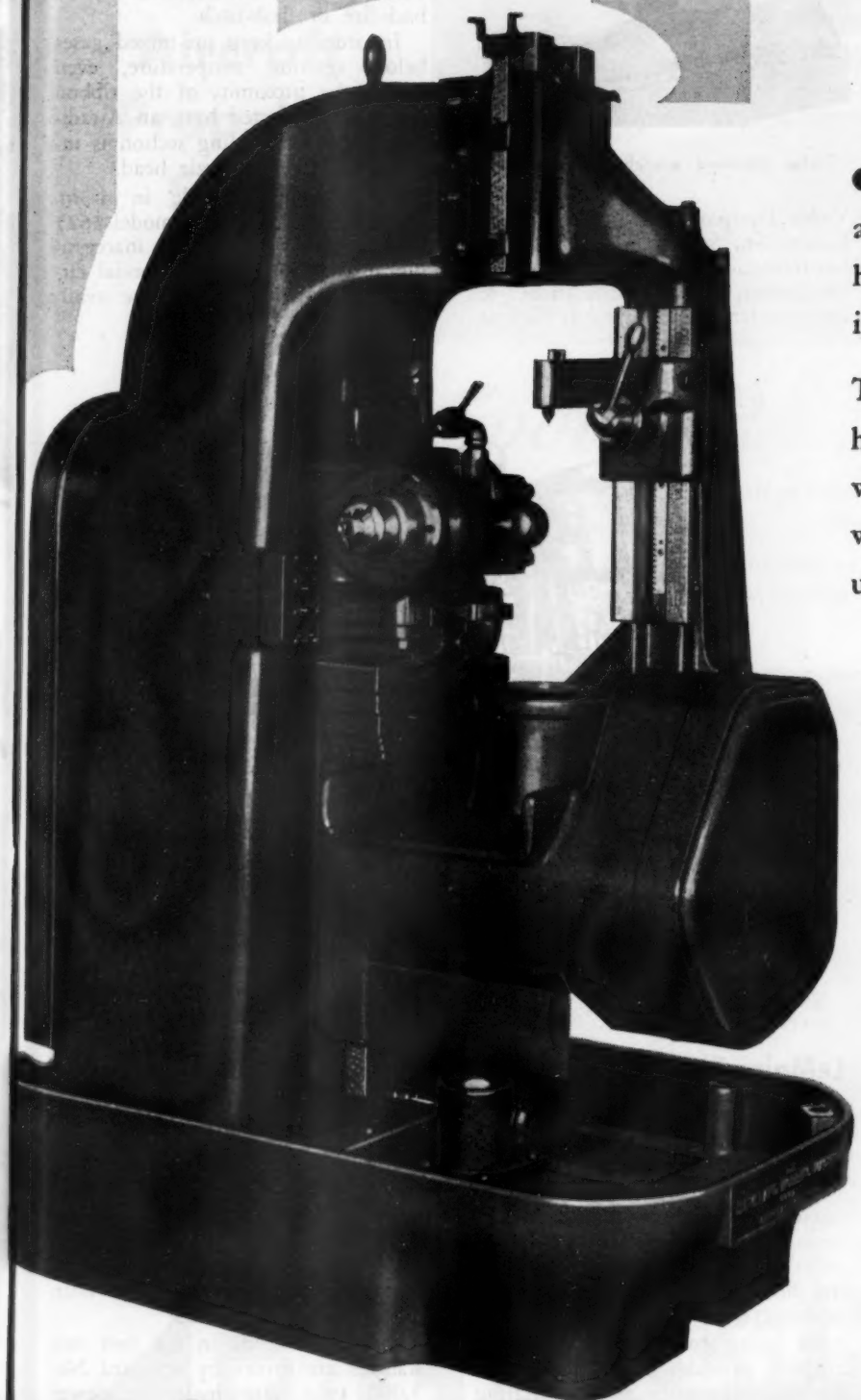


Hill radius grinding fixture

The fixture has a column which carries a horizontal spindle. On one end is the operating handwheel with a disk and adjustable stops to limit the arc of swing. On the other end

THE RIGIDHOBBER

HOBS GEARS AND SPLINES ACCURATELY

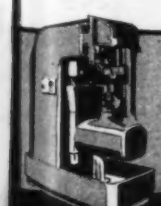


● The Rigidhobber is designed and built to generate precision hobbed gears and splines either in quantity or small lots.

The rigid support to the work-head both above and below the work eliminates spring in either work or hob and assures the utmost in precision.

For accurate work—high production—low cost generation of splines and hobbed gears consult Cleveland Hobbing Engineers.

This bulletin tells all about Rigidhobbers—what they are—how made—and how they help to reduce your costs.



The CLEVELAND HOBBING MACHINE Company

General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

is the head which has two micrometer-set, adjustable cross-slides which are at right angles to each other. These slides permit positioning of the cutter so the center of the tooth radius coincides with the center line of the fixture spindle. The outer slide carries an adaptor plate on to which the work is clamped. On the inner side of the head is a graduated scale and also a lock plunger to secure the adaptor plate.

On the base is a graduated scale so the column can be swung to the desired back-off. There is an adjustable spring stop for index. Two fittings needed for the initial set-up are also furnished—a diamond dresser and a gage for squaring the first tooth face.

Hall Large Size Collet Chuck is Now Available

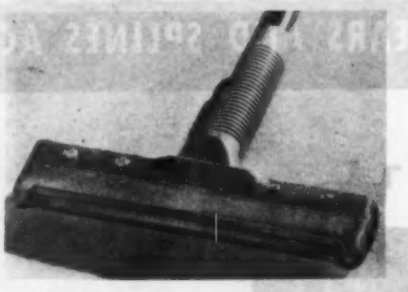
Collet chucks produced by Hall Manufacturing Co., 622 Tularosa Drive, Los Angeles 26, Calif., are now available in 2 in. size. This collet chuck completely eliminates latches, fingers, cams, dogs and ball locks. Instantaneous locking or releasing is said to be possible without stopping

Hall large size collet chuck

the lathe. It provides full spindle capacity and automatically adjusts itself to variations in the diameter of the bar stock.

The new design of Hall collet chucks calls for a much shorter locking lever than older models. Friction and heat are eliminated by the fact that all parts turn at spindle speed. These chucks are made to fit any lathe.

Victor Standard Descaling And Flame Priming Nozzle



Victor standard descaling attachment

Victor Equipment Company, 844-54 Folsom St., San Francisco 7, Calif., has introduced its standard descaling attachment, which is easily attched to any standard welding torch butt of that company's manufacture, or it can be furnished with a torch butt to those who do not have one.

The attachment is provided with a spiral mixer and gas proportioner to handle with greater efficiency the larger gas volumes required in these operations; this mixing device is said virtually to assure freedom from back-fire or flash-back.

In order to keep pre-mixed gases below ignition temperature, even within the proximity of the ribbon flame and deflected heat, an Airaditor aluminium cooling section is incorporated at the nozzle head.

The nozzle is made in 4 in. (model 361) and 6 in. (model 362) ribbon flame widths. For inaccessible areas or rivet heads, special circular multi-flame nozzels are available.

LeMaire Automatic cylinder block borer and finisher

LeMaire Three-Station Automatic Cycle Machine Drills And Finishes Large Truck Cylinder Block Castings

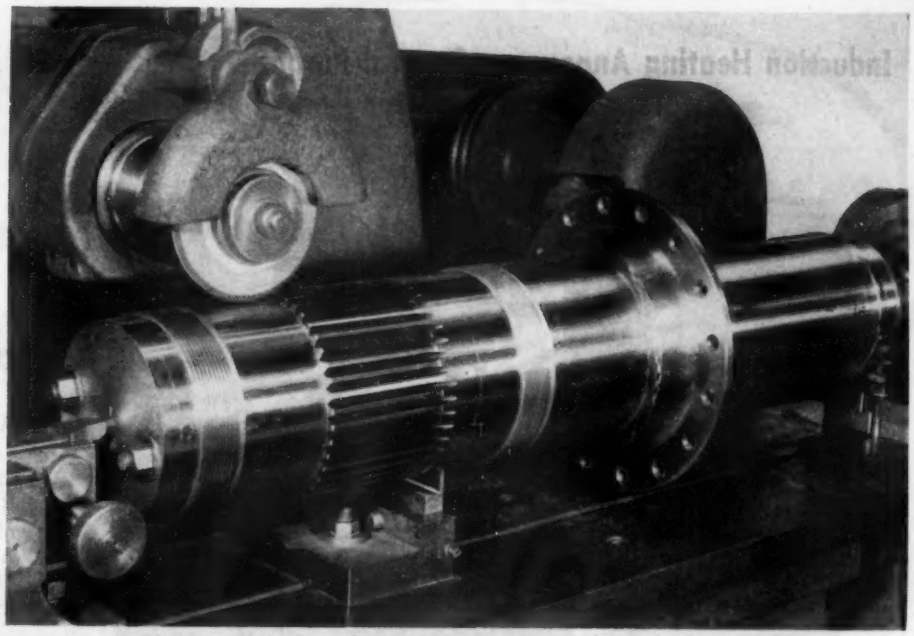
LeMaire Tool & Mfg. Co., Dearborn, Mich., has developed a three station machine capable of rough drilling through the solid casting of truck cylinder blocks, then semi-finishing and finally finish-reaming them, all in one cycle.

By being conveyor indexed, the machine provides a progressive set-up that eliminates much handling of heavy parts from one machine to another.

The first station is used to drill four holes through the solid surface of the casting. One of the holes is also counterbored and spot faced to 2⅜ in. dia. The second station, equipped with a four-spindle head, semi-finish reams the holes. The third station finish-reams two 1¼ in. holes and two 2 in. holes within an accuracy of 0.001 in.

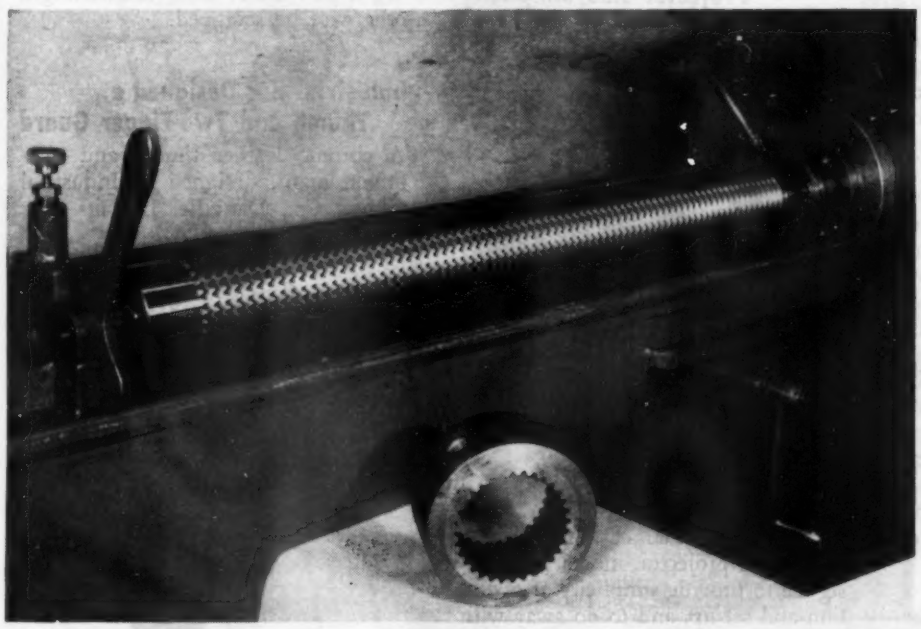
The drill heads in the first two stations are driven by standard No. 5,000 twin ram hydraulic power units mounted at a ten degree angle on the face of the column. The third station has a sliding type unit that slides on machined ways 63 in. long, 4 in. wide, spaced 16 in. apart.

Spline Grinding Aircraft Propeller Shaft



"In the Spotlight"... for Post-War

SPLINE BROACHES UP TO 84 INCHES LONG. Complete Broach Tooling and Engineering Service. . . . . GAGES, Serration or Spline, male or female . . . . . Master Gears and Gear Racks. . . . . Master Index Plates. . . . . Splined Arbors for gear-grinding. . . . . Hobbing, Shaving and Checking. . . . . Production Broaching and Machining. *Available from stock: Radius gages for checking form and hook on broach tooth forms.*

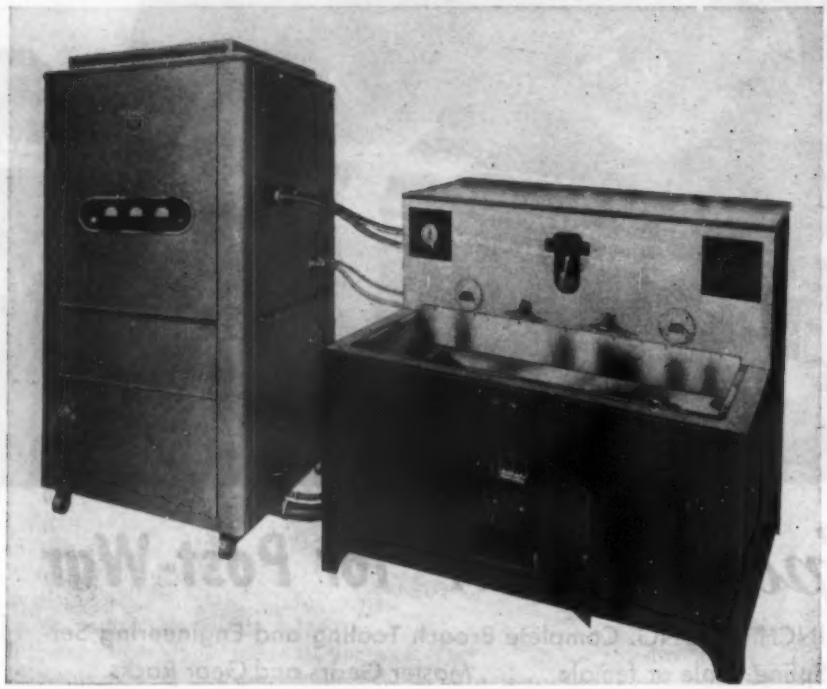


Involute Spline Broach and part of Wrench being Broached for Aircraft Engine Crankshaft

GREAT LAKES
Broach & Gage Company

1008 FRANKLIN STREET . . . DETROIT 7, MICHIGAN

Induction Heating Announces General-Purpose Two-Station Hardening and Quench Table



Induction Heating hardening and quench table

A general purpose two-station hardening and quenching table used in connection with high-frequency induction heating generators and suited to a wide variety of machine parts requiring surface hardening or localized heating, is announced by Induction Heating Corp., 389 Lafayette St., New York 3, N. Y.

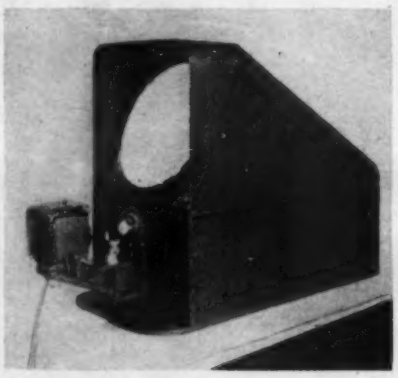
Arranged with quick change coil connections so that jobs can be set up in 2 to 3 minutes to change a heating coil, it is only necessary to make two coupling connections to the leads located at each outlet station. It can be used either as a single purpose unit, using two identical fixtures, or it will serve as a general-purpose table for various hardening operations.

An initial timer is provided, so that when a new part or new job is to be induction treated, the heating time will be recorded, eliminating the need for a stop watch.

The table is also equipped with a master 3-stage timer, located at the front, which automatically controls the heating and quenching positions of the cycle.

Hose connections are provided at the front of the panel, which in turn connect to quench rings that surround the part being heated, thus permitting a spray quench to be applied. The duration of the quench is controlled by the master timer operating a solenoid valve.

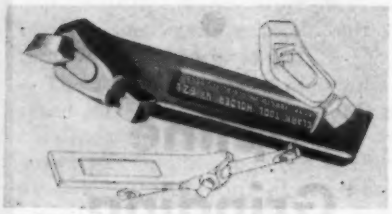
Portman Bench Model Optical Projector Has Simplicity



Portman optical projector

The Portman Optical Co., 70 Mill Road, New Rochelle, N. Y., has placed on the market a new bench type opticl projector, model P2.5, designed to provide simplicity of operation and set up, and to do away with numerous mechanical adjustment features.

The projector is furnished with a standard full size 14½ in. dia. working screen. Its stage area is 4 × 4 in., the overall length is 42 in., width 18 in. and height 32 in. It can be furnished with a choice of 10X, 25X, 50X or 90X magnification lens units and may be operated on ordinary light circuits of 110 v.



Clark adjustable toolholder

Clark Adjustable Toolholder Has Adjustable Vise Grip

A new adjustable toolholder with a vise grip for use in lathes, shapers and planers is announced by the Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif. Adjustability makes possible the use of any of four or more sizes of tools in the same holder. Models available are the 15 deg. sloping cutter channel type and the horizontal or parallel channel type in both right and left hand offset. Each type is available in several shank sizes.

In addition, the Clark toolholder has a special vise grip jaw which has clamping action for holding the bit vertically and horizontally with pressure evenly distributed over the entire holder channel. This vise grip holds very short toolbits rigidly, making it possible to use bits that might otherwise be scrapped.

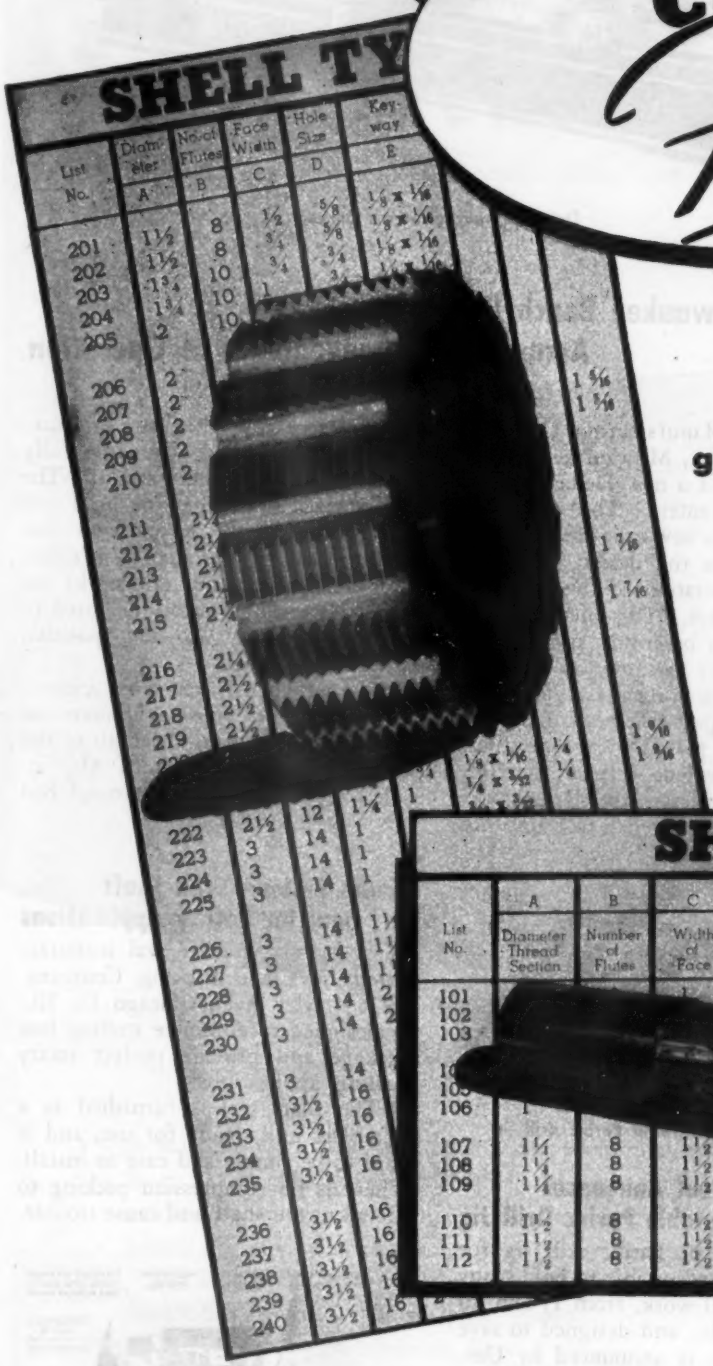
Industrial Has Designed a Thumb and Two-Finger Guard

A chrome leather thumb and two-finger guard, designed by Industrial Gloves Co., Danville, Ill., fits over

Industrial glove guard

the regular cotton glove and increases its wear. It also makes possible the salvaging of many practically worn out gloves. The guard is inseam cotton thread sewed. It may be outseam steel stitched if desired.

HOW TO GET THREAD MILLING CUTTERS *Faster*



SHELL TY

List No.	Diameter A	No. of Flutes B	Face Width C	Hole Size D	Keyway E
201	1½	8	½	⅝	⅛ x 1/16
202	1½	8	¾	⅝	⅛ x 1/16
203	1¾	10	¾	¾	⅛ x 1/16
204	1¾	10	1	¾	⅛ x 1/16
205	2	10			
206	2				
207	2				
208	2				
209	2				
210	2				
211	2¼				
212	2¼				
213	2¼				
214	2¼				
215	2¼				
216	2¼				
217	2½				
218	2½				
219	2½				
222	2½	12	1¼	1	¼ x 3/32
223	3	14	1	1	¼ x 3/32
224	3	14	1	1	¼ x 3/32
225	3	14	1	1	¼ x 3/32
226	3	14	1¼	1¼	¼ x 3/32
227	3	14	1¼	1¼	¼ x 3/32
228	3	14	1¼	2	¼ x 3/32
229	3	14	1¼	2	¼ x 3/32
230	3	14	1¼	2	¼ x 3/32
231	3	14	1¼	2	¼ x 3/32
232	3	16	1¼	2	¼ x 3/32
233	3	16	1¼	2	¼ x 3/32
234	3	16	1¼	2	¼ x 3/32
235	3	16	1¼	2	¼ x 3/32
236	3½	16	1¼	2	¼ x 3/32
237	3½	16	1¼	2	¼ x 3/32
238	3½	16	1¼	2	¼ x 3/32
239	3½	16	1¼	2	¼ x 3/32
240	3½	16	1¼	2	¼ x 3/32

Order by

STOCK BLANK NUMBER

giving Pitch and Thread Form desired

•

DETROIT

STANDARD STOCK BLANKS MEET 90% OF ALL THREAD MILLING CUTTER REQUIREMENTS

SHANK TYPE

List No.	A Diameter Thread Section	B Number of Flutes	C Width of Face	D Length of Shank	E Length Overall	F Shank Diameter Large End	G Shank Taper			H Drawbar Threads
							Jarno	Brown & Sharpe	Morse	
101				3 1/16	5¼	.884	7			½-13NC
102						.922		8		⅝-24NF
103									3	½-13NC
10										½-13NC
105										⅝-24NF
106	1									½-13NC
107	1¼	8	1½		6¼					½-13NC
108	1¼	8	1½	4⅞	6¼					⅝-24NF
109	1¼	8	1½	3⅛	5½	.948				½-13NC
110	1½	8	1½	4 11/16	6¼	1.134	9			½-13NC
111	1½	8	1½	4⅞	6¼	1.271		10		⅝-24NF
112	1½	8	1½	3⅛	5½	.948			3	½-13NC

FOR STANDARD STOCK SIZES, ASK FOR BULLETIN No. CB-43

BUY U.S. BONDS STAMPS

DETROIT TAP & TOOL CO.

8432 BUTLER
DETROIT 11
MICH. U.S.A.

Lincoln Carblox Supplement And Protect Gage Blocks

Lincoln Park Industries, Lincoln Park 25, Mich., announce Carblox cemented-carbide gage blocks in the Hoke (square) type. As a series of wear blocks to be used on the ends of a gage block build-up, Carblox are said to provide the means to reduce greatly the wear error in gage block use, while supplementing and increasing their useful, accurate life. They act as protective anvils, preventing wear on the less wear-resistant

Lincoln Park Industries Carblox

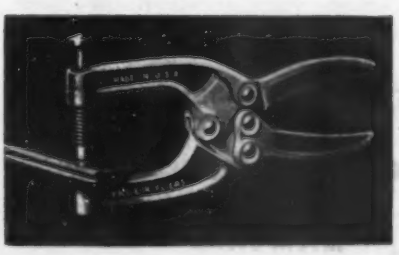
steel blocks, but can be used as individual blocks.

Hoke type Carblox are 0.950 in. sq. with 0.260 in. holes and are available in either "A" accuracy (0.0000-04 in.) or "B" accuracy (0.000008 in.) in sets of two (0.050 in. or 0.100 in.) in sets of four (two each of 0.050 in. and 0.100 in.) and in sets of 14 varied sizes.

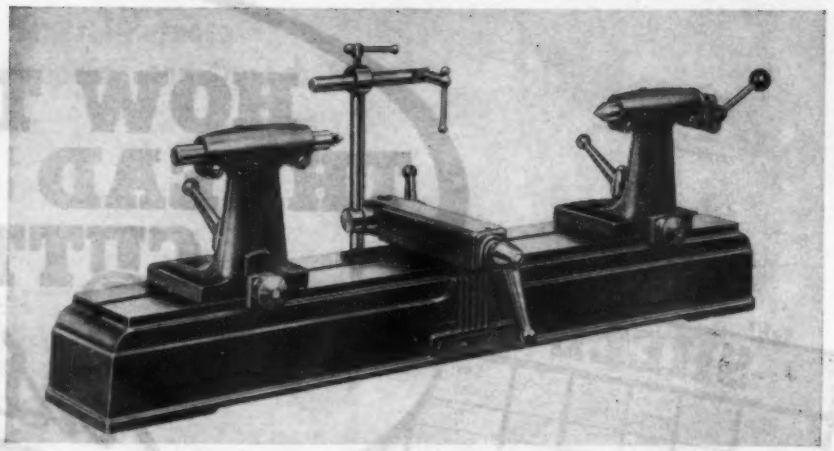
Knu-Vise Vari-Grip Plier Compensates for Thicknesses

A new improved "Vari-grip" KL-450 plier, announced by Knu-Vise, Inc., Eighth and Plum, Detroit, Mich., has a self-setting pressure spindle to compensate for any variations found in the thickness of metal or parts clamped. It is especially designed for holding aircraft skin or metal during riveting.

The Vari-grip is 8 in. long and weighs 22 oz. Its throat capacity is 0 to 3/8 in.; depth is 2 5/8 in.



Knu-Vise Vari-Grip plier



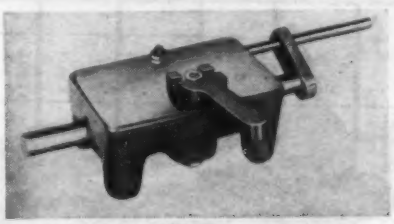
Delta-Milwaukee bench center

Delta-Milwaukee Bench Center Combines Accuracy and Convenience of Operation

The Delta Manufacturing Co., 620 E. Vienna Ave., Milwaukee 1, Wis., has announced a new Delta-Milwaukee bench center. The Company states that this new unit offers unique advantages in the design, construction, and operation of the indicator support bracket. This bracket has a base that can be firmly and quickly locked in any position on the bed by merely operating a handle at the front. The part that holds the indicator can be placed in any position. Large convenient clamp handles make it unnecessary for the operator to use pliers or wrench to clamp the indicator or any other part in place.

The bed is a heavy casting, fully normalized to relieve strain. The top surface is flat and the head and tail stocks can be reversed so that the unit can be operated from either side. The head and tail stocks are identical castings, precision bored to make alignment in any position true and accurate.

The new bench center has a maximum distance between centers of 19½ in. The over-all length of the bed is 32 in., the width 5½ in. The dimensions of the ground bed are 4½ in. × 30 in.



Universal adjustable Parlec drill jig

Universal Tool Announces Adjustable Parlec Drill Jig

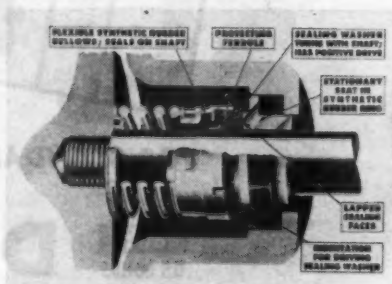
A new type of Parlec drill jig for round stock, adjustable to hold many sizes of small work, from 1/4 in. to over 2 in. dia., and designed to save tooling time, is announced by Universal Tool Co., 919 E. Redondo Blvd., Inglewood, Calif.

The body is ground top and bottom with a 45 deg. angle finished in center. The equalizing clamp is also ground top and bottom with a 30 deg. angle finished in center. It is furnished with a finished base.

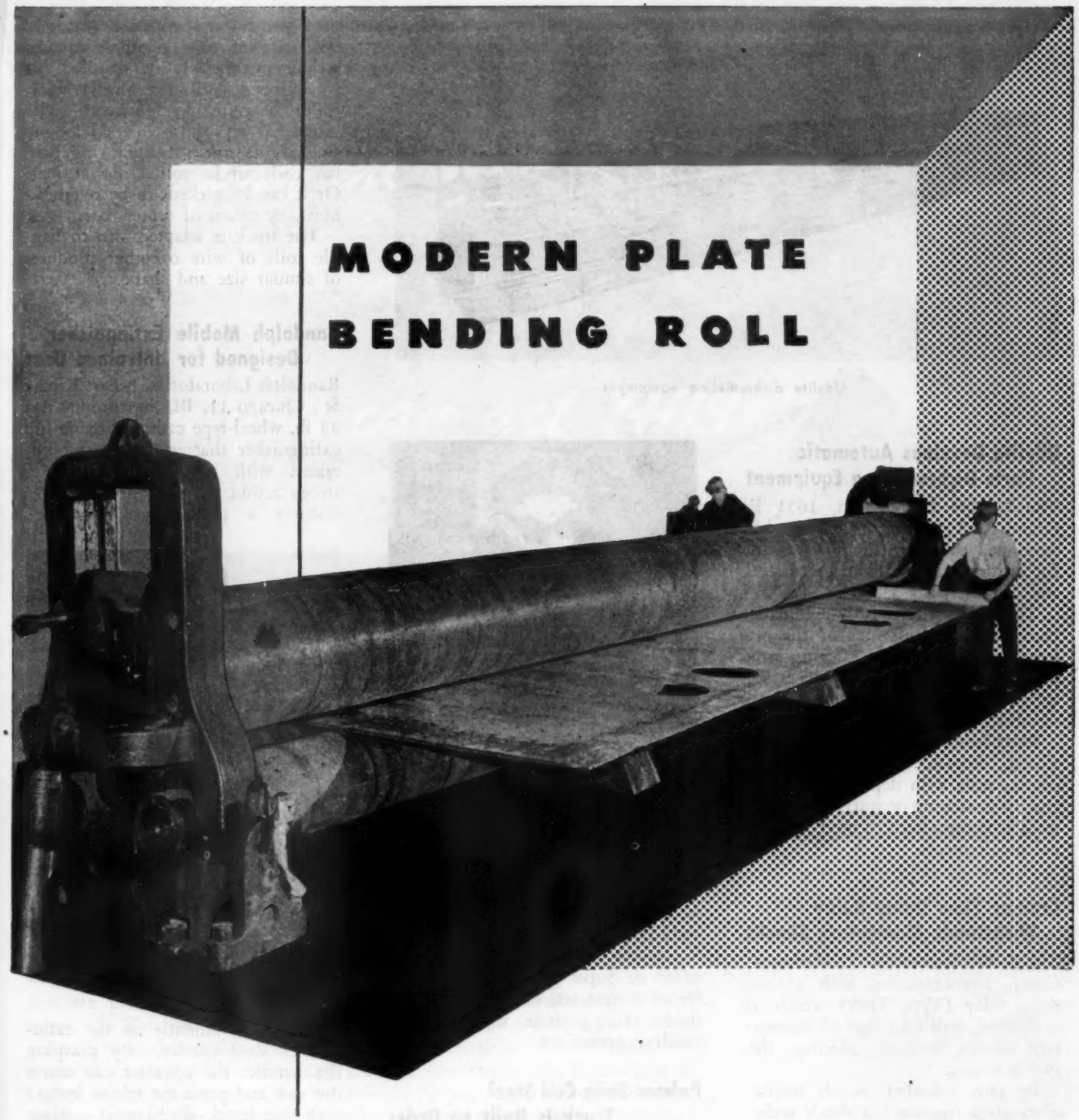
Crane Bellows-Type Shaft Seal for Rotary Applications

A bellows-type shaft seal manufactured by Crane Packing Company, 1875 Cuyler Ave., Chicago 13, Ill., is designed to eliminate stuffing box leakage and provide perfect rotary sealing applications.

The shaft seal is furnished as a complete unit, ready for use, and is said to be simple and easy to install. There is no compression packing to freeze to the shaft and cause trouble.



Crane bellows-type shaft seal

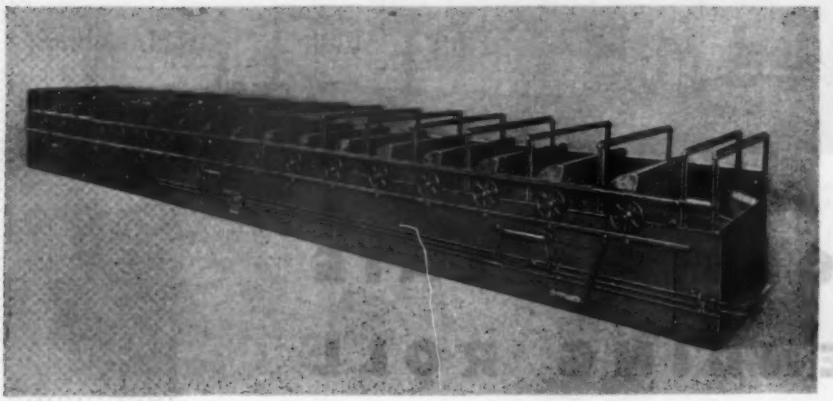


A Baldwin Southwark Bending Roll in operation at a shipyard. This bending roll can handle plates up to 32 feet in length and one inch in thickness. The upper 32 inch roll of this machine is supported at the left-hand by a housing which can be tilted away from the top roll by hydraulic power to permit the removal of plates that have been rolled into cylinders.

The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia, Penna., U. S. A. Offices: Philadelphia, New York, Washington, Boston, Chicago, Cleveland, St. Louis, San Francisco, Detroit, Houston.

BLW THE BALDWIN GROUP

BALDWIN
SOUTHWARK
HYDRAULIC PRESSES



Udylite dichromating equipment

Udylite Develops Automatic Parts Dichromating Equipment

The Udylite Corporation, 1651 E. Grand Blvd., Detroit 11, Mich., has developed equipment and processing for dichromating of zinc coated steel and die cast parts.

The equipment is fully automatic, eliminating irregularities of the old hand dip method and carrying bulk parts through a complete processing cycle by means of a split timed dwell schedule.

Parts being processed are cleaned, rinsed, dipped, drained and dried continuously with dependable results and no scratching or scarring. Equipment is custom built to meet individual requirements.

Cramer Time Delay Relay Withstands Momentary Shocks

The R. W. Cramer Co., Centerbrook, Conn., has come out with a time delay relay (Type TD5) which, it is claimed, will take care of momentary shocks without affecting the switch circuit.

Its cam operated switch mechanism gives the timer a shock resisting quality.

American Optical Introduces Improved Duraweld Goggles

A new, improved AO404A Duraweld welding goggle introduced by American Optical Co., Southbridge, Mass., is described as providing better protection and greater comfort for welders' eyes. The eyecups are anatomatically molded for the right and left eye and have larger, more comfortable edges, rounded to fit flush against the contour of the face. Shallow, deep-sided eyecups provide balance between proper height for wider vision and adequate protection.

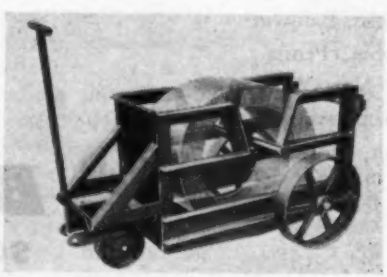
As standard equipment, the new

American Optical Duraweld goggles

goggles are fitted with Noviweld lenses in shades 3 to 6 and 8. Optional equipment includes Filterweld lenses in shades 3 to 8; Noviweld-Didymium lenses, for absorbing yellow sodium flare, in shades 3 to 6; or Super Armorplate Calobar lenses of medium, dark, or extra dark shades for persons working near welding operations.

Palmer-Shile Coil Steel Truck Is Built on Order

Palmer-Shile Company, 780 South Harrington Ave., Detroit 17, Mich., has added an improved, heavy duty, coil steel truck to its line of specialized materials handling equipment. The truck is built only on order, to



Palmer-Shile coil steel truck

take care of coils of the size and weight intended to be handled. It is equipped with three heavy duty, roller bearing metal wheels. The safety bar at rear is chained to one side of the truck; by removing this, bar coil can be rolled out at rear. Or it can be picked up by overhead hoist, by means of center bar.

The truck is adapted also to handle coils of wire or other products of similar size and shape.

Randolph Mobile Extinguisher Designed for Untrained User

Randolph Laboratories, 8 East Kinzie St., Chicago 11, Ill., has produced a 25 lb. wheel-type carbon dioxide fire extinguisher that is moved and operated with uninterrupted, single-sweep action. The Randolph "25" features a palm-trigger valve,

Randolph mobile fire extinguisher

mounted conveniently on the extinguisher steel handle. By grasping the handle, the operator can move the unit and press the release button with one hand, discharging a blanket of carbon dioxide 10 to 20 ft.

Mounted on hard-rubber wheels, the unit is self-balanced—standing or in operation.

Topflight Broken Drill Adapter for Small Sizes

The "Baby-Giant" broken drill holder, available from the Topflight Tool Co., Towson 4, Md., is built to accept small drills from No. 80 to No. 60. Accurate, concentric drilling is assured through a patented self-locking device which holds the broken piece of drill firmly in place. Drilling vibration tightens the grip of the adapter; yet the drill fragment can be removed easily.

Why pay more for **THIS**

When you can get **THIS**

and quickly grind to **THIS**

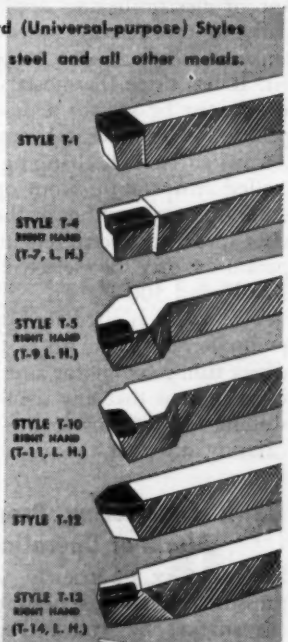
Specify STANDARDS *for Maximum Savings.*

With Standard (Universal-purpose) Carboloy Tools in your tool crib, you are prepared to meet your carbide tooling requirements in three ways: (1) You can use Standards "as is" for a large percentage of your general machining; (2) you can quickly grind minor variations when required; and, (3) for emergency tooling, you can adapt Standards to highly specialized shapes, even intricate forms, to meet urgent needs. Modern techniques for grinding carbides (training film strip available) permit amazingly rapid grinding. Conversion to special angles usually requires but little more than ordinary regrinding of dull tools.

Hundreds of leading plants have found Standard Carboloy Tools the answer to maximum convenience and economy in carbide tooling. Available in 10 styles, all commonly used sizes, and 5 grades for cutting steel and all other metals and non-metallics.

CARBOLOY COMPANY, INC.
11149 E. 8 MILE AVE., DETROIT 32, MICHIGAN
Birmingham • Chicago • Cleveland • Detroit • Los Angeles • Milwaukee • Newark
Philadelphia • Pittsburgh • Thomaston
(Also sold through many leading Mill Supply Distributors)

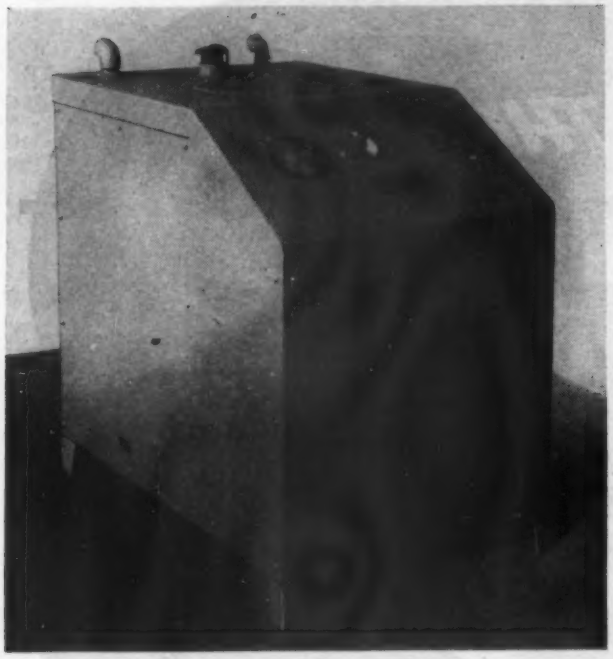
★ 10 Standard (Universal-purpose) Styles for cutting steel and all other metals.



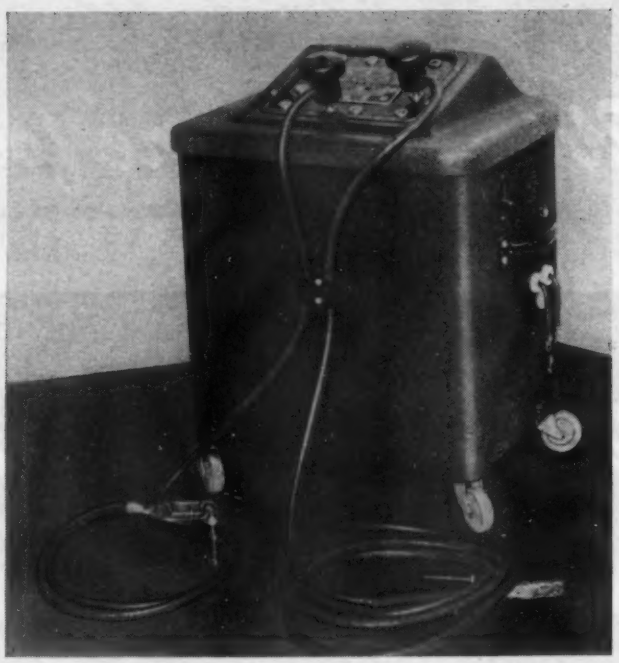
CARBOLOY TRADEMARK **STANDARD TOOLS & TIPS**

"You ALWAYS Get Standards FASTER Than 'Specials'"

SEND FOR FREE CATALOG GT-175



Youngstown oil circulator and heater



Ergolyte a.c. arc welder

Youngstown Automatic Oil Circulating, Heating Unit

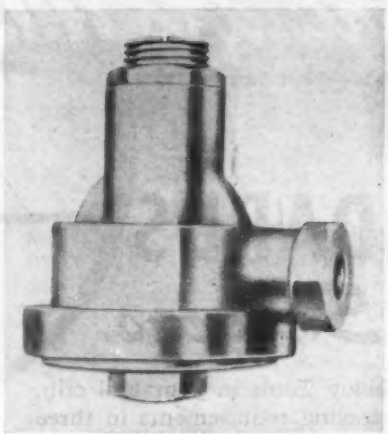
Model S-12 oil heating unit has been designed by Youngstown Miller Co., Sandusky, Ohio, to provide heat transfer oil to machines which require elevated temperature.

A typical model or size has 12.8 kw. of electric heaters applied externally to the heating portion of the tanks and capacity for 12 gallons of oil. It has three thermostats, each of which can be set for a desired temperature by the user. A simple selector switch enables changing the controlled temperature from one to another by putting either of the thermostats into the electric circuit. Temperatures may be selected between 200 F. and 500 F.

Heated oil is circulated by a rotary pump driven by 1/2 hp., 1,150 r.p.m. direct connected motor and the pump is so located that any drip from the stuffing box returns to the main circulating oil pool.

Hawk Engineering Pressure Alarm or Operating Switch

Pressure-Clix, a newly developed pressure switch has been placed on the market by Hawk Tool & Engineering Co., 7663 Epworth Blvd., Detroit 4. It features a variety of adjustment ranges up to 125 lb. operating pressure and uses a composition diaphragm in conjunction with a snap action switch. It is recommended by the manufacturer for use as an alarm or operating switch on



Hawks Pressure-Clix

oil, air or other gases and liquids being handled under pressure.

The switch is available in either normally closed or normally open contacts and will handle up to 15 amp. at 24 v., d.c. or 12 amp. at 110 v., a.c. inductive loads.

Ergolyte A.C. Arc Welders Feature High Cycle Device

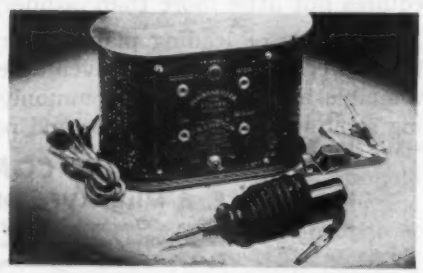
Ergolyte Manufacturing Co., 3644 Lawrence St., Philadelphia, Pa., has produced two differently sized a.c. arc welders in four models each, said to be capable of meeting practically every welding requirement. The machines have sloping control panels for increased worker convenience. They are available in 160 amp. and 250 amp. range. Each features the high cycle device, which starts the arc before the rod touches the work. Model F is designed for continuous welding; model C is suggested for intermittent welding operations. The 160 amp. machine has 20 heat steps and the 250 amp., 24 steps. The smaller machine weighs 150 lb. and the larger, 185 lb.

Frampton Electrical Announces Demagnetizer and Etcher

An improved type of demagnetizer and etcher has been announced by Frampton Electrical Equipment Company, 223 Hickory St., Dayton 10, Ohio.

The new unit is described as compact, sturdy and portable, weighing 16 lb. It will demagnetize any size tool or die.

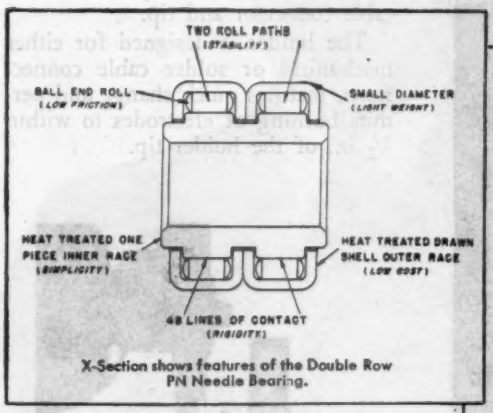
Etching is performed by plugging the etching pencil into one of three



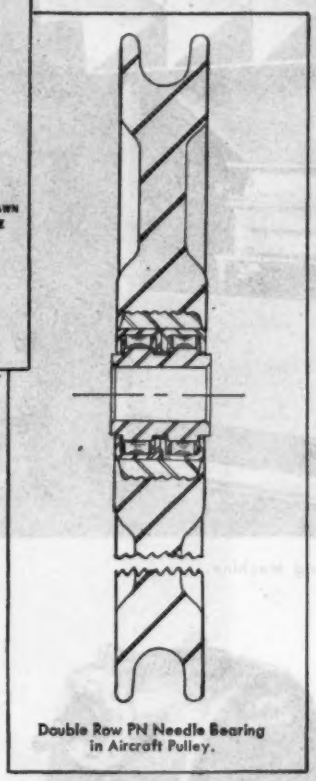
Frampton demagnetizer and etcher

jacks, depending on the wattage to be used. Metals of any thickness may be etched. The unit is designed for use with 110 v., 60 cycle, single phase circuit.

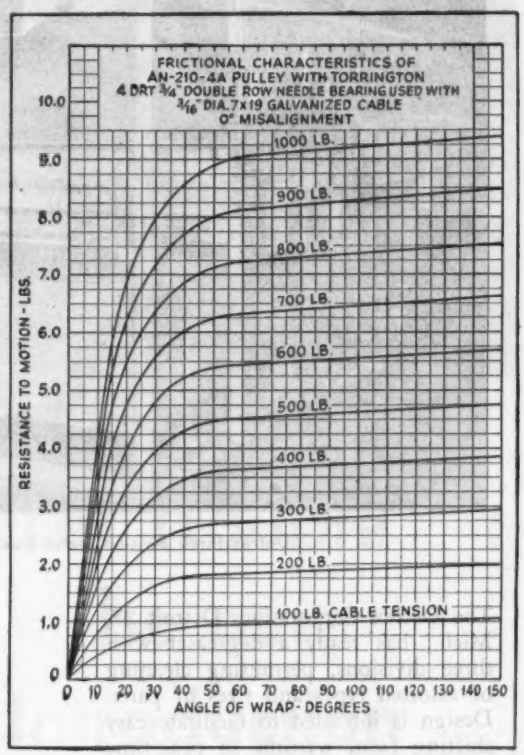
PN Needle Bearing Minimizes Friction in Aircraft Pulleys



X-Section shows features of the Double Row PN Needle Bearing.



Double Row PN Needle Bearing in Aircraft Pulley.



DOUBLE ROW PN TYPE BEARING OFFERS MANY ADVANTAGES IN PULLEY OPERATION

•

The double row PN Needle Bearing has a friction coefficient favorably comparable to that of other anti-friction bearing types and offers several other outstanding advantages to meet all aircraft pulley requirements.

Fully conforming to all requirements of AN-FF-P-796 Specifications, this Torrington Needle Bearing offers these plus features in addition to superior anti-friction operation (illustrated in the accompanying graph):

(1) *Design:* Double row of ball-end type rollers reduces friction under side loads.

(2) *Stability:* Double row of rollers gives greater stability to operation under the deflectional stress of pulley operation.

(3) *Weight Saving:* A considerable saving in weight is obtained through the small O.D. of the Needle Bearing.

(4) *Capacity:* The full complement of small diameter needles provides ample capacity for all standard government and individual company requirements.

(5) *Lubrication:* The enclosed design provides for ample lubrication—without excess grease to impede action at low temperatures.

(6) *Cost:* The simplicity of design of the double row PN Needle Bearing offers every anti-friction advantage at minimum cost.

Aircraft pulleys equipped with this Needle Bearing are now available in a range of sizes to meet your requirements. Ask your regular pulley supplier for further information or write our engineering department for additional data. Copies of test results on anti-friction performance characteristics of the double row PN Needle Bearing under all types of conditions are available on request. Send today for a set for your engineering files.

THE TORRINGTON COMPANY

Established 1866 • Torrington, Conn. • South Bend 21, Ind.

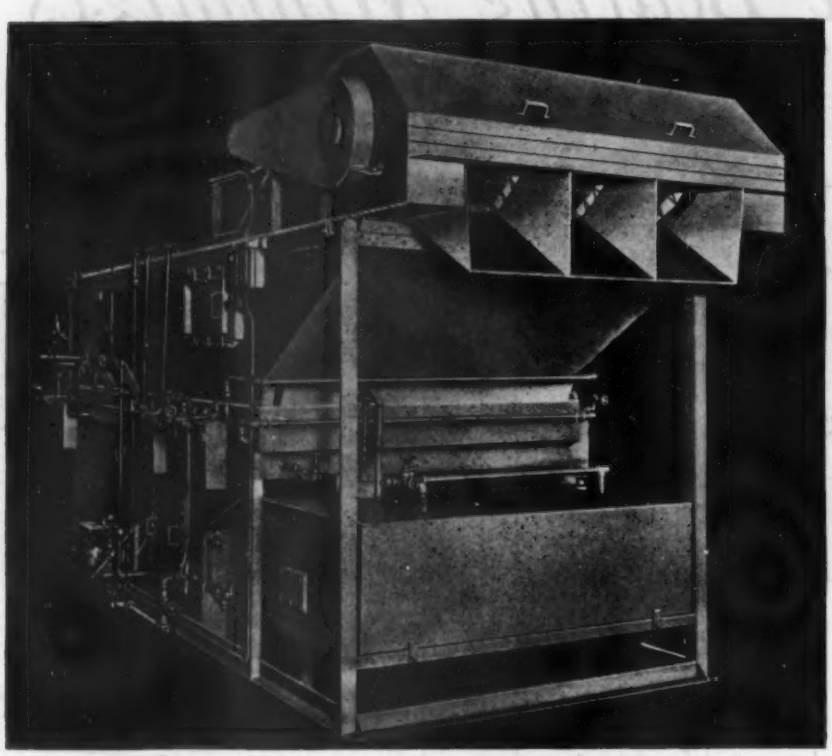
"Makers of Needle Bearings and Needle Bearing Rollers"

New York Boston Philadelphia
Detroit Cleveland Seattle
San Francisco Chicago Los Angeles
Toronto London, England

TORRINGTON

NEEDLE BEARINGS

Detrex Three Place Metal Cleaning Machine Is Designed for Easy Conversion to Peacetime Output



Detrex three division metal cleaning machine

The Detrex Corporation, Detroit 27, Mich., has ready a degreaser with three divisions, permitting cleaning of assorted types and sizes of parts. Design is intended to facilitate easy shifting from wartime to peacetime production, with no change necessary in construction of this degreaser when conversion is made.

Retriever Hose Reel Line Announced by Wayne Pump

The Wayne Pump Company, Fort Wayne 4, Ind., announces a new line of hose reels for industrial use which will be marketed under the name "Wayne Retriever." They are improved models of those formerly known as "Air Scale" hose reels.

These reels are said to eliminate waste motions and save time because the air line is always available for instant service. When not in use, it is out of the way; this prevents accidents and lengthens hose life.

The reel is described as quickly retrieving the hose with an automatic rewind spring, while the hose is easily and freely unrolled by the operator. A ratchet clutch holds the line at any desired length until released by a short forward pull. Automatic braking action prevents whip, lash or runaway. The universal bracket permits mounting in any position. It is made in four models to accommodate 12, 18 and 50 ft. of hose.

Wayne Retriever hose reel

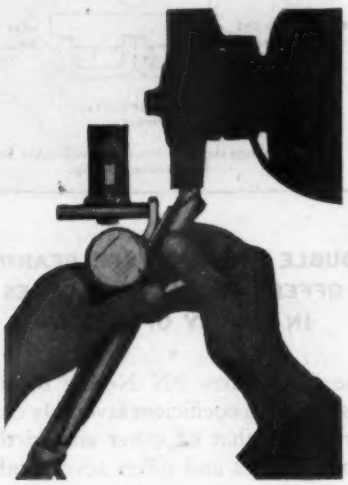
Allison Electrode Holder Made For Sturdiness, Simplicity

Announced by the Allison Tool & Engineering Company, 4031 Whittier Blvd., Los Angeles 23, is the new Allison electrode holder for welding. Model "A" is a 19 oz. unit built to handle heavy 300-500 amp. work while Model "B" is a 6¼ oz. holder for lighter 200 amp. jobs.

It is described as a simple, sturdy holder molded of high heat resistant plastic to insure full insulation and and eliminate completely all possibility of arcing due to slag, moisture or contact with grounded surfaces. It has only three main parts: handle, cable connector and tip.

The holder is designed for either mechanical or solder cable connections, features quick change and permits burning of electrodes to within ½ in. of the holder tip.

Allison electrode holder



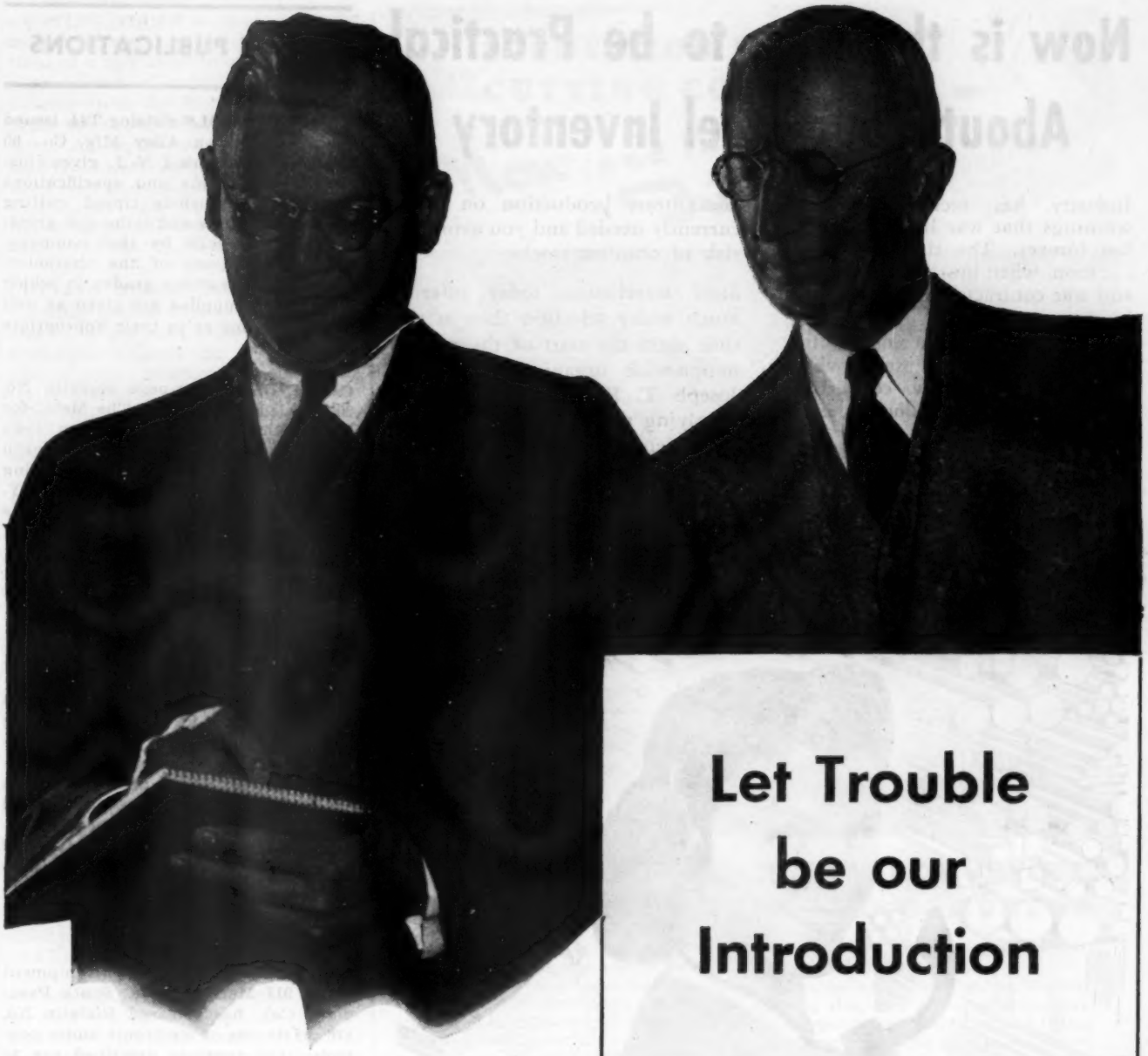
Ameraco Majestic drill sharpener

Ameraco Majestic Drill Sharpener Fits Any Grinder

A sharpener for all sizes of drills is announced by the Ameraco Industrial Specialties, 122 S. Michigan Ave., Chicago. It is claimed that this drill sharpener fits any grinder, is easily adjusted to drill hard or soft materials and sharpens straight or No. 2 taper shank drills perfectly.

An instruction dial enables anyone, with brief practice, to sharpen drills accurately in sizes from 5/32 to 1 in. This dial insures accuracy in measuring angles and clearances on twist drills.

Each unit is described as precision built, individually calibrated and tested. The manufacturer claims that a drill sharpened on this unit will drill a hole in much less time due to the cutting edges being uniform with angles the same on both sides.



Let Trouble be our Introduction

THERE's nothing like trouble to bring people together. That's why some of Revere's closest friends were gained through a mutual struggle against difficulties, troubles such as occasionally beset any business.

For an example, take the case of an important restricted war product. Rejections were running as high as 25%, due to trouble never before experienced with some of the material used in it. The manufacturer came in person to Revere, explained his difficulties, and asked if we could make any suggestions. We studied the matter in detail, and decided that a change in the traditional method of making the item might produce better results, but at a slightly higher cost. A special test run was made, and this proved to be completely successful. And, to our mutual delight, in the end the cost was not increased.

Revere, you see, has an open mind as well as an informed one, and is always ready to question the customary, find the answers to new problems. If something is worrying you in your employment of non-ferrous metals, get in touch with Revere, not for ready-made answers, but for wholehearted cooperation, a joint search for better results. This help is given freely, without obligation, of course. After all, we ought to know something about this business. We have been in it for 143 years.

* * *

Write for your complimentary copy of "Revere Copper and Copper Alloys—Technical Information for Product Designers." Contains 54 pages, with 106 graphs of physical and metallographic properties, a new chemical and physical properties chart, valuable illustrated data on welding.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

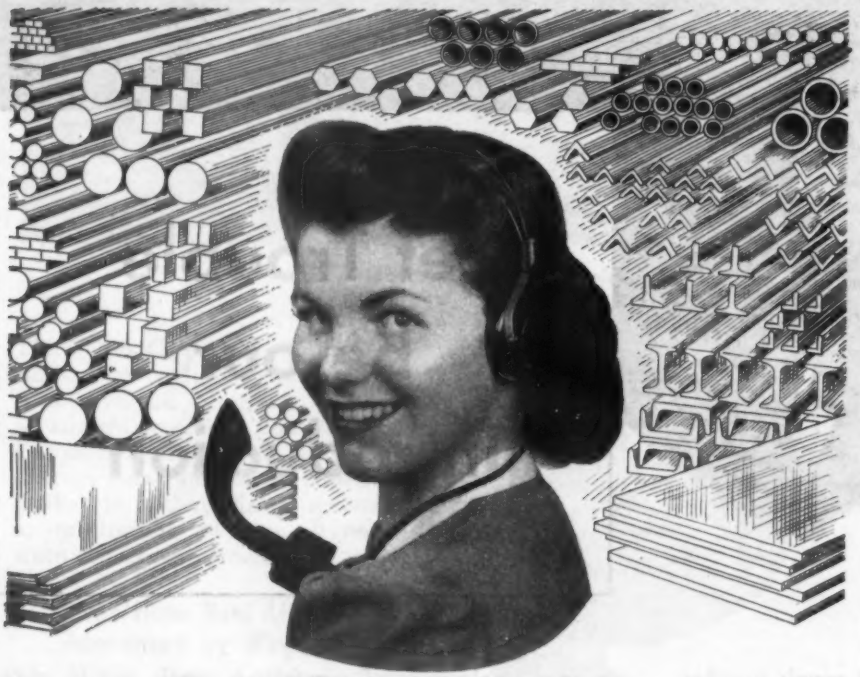
Executive Offices: **230 Park Avenue, New York 17, N.Y.**

Now is the Time to be Practical About Your Steel Inventory

Industry has received repeated warnings that war business cannot last forever. The time will come . . . soon, when hostilities will cease and war contracts will be drastically cut or cancelled. It is wise, therefore, to adopt a conservative inventory policy on steel which may not be readily convertible when peace time production is resumed.

You are being urged from all sides to buy steel only as you need it. In this way steel mills are able to concentrate production on steels currently needed and you avoid the risk of obsolete stocks.

Steel warehouses today offer a much wider selection than at any time since the start of the war. A nation-wide organization such as Joseph T. Ryerson & Son, Inc., supplying thousands of items from convenient stocks, is your surest source of steel. You can depend on Ryerson for all types of steel in any reasonable quantity.



Call Ryerson When You Need Steel

Every type of steel from stainless to structurals is immediately available from Ryerson stock. Just reach for the phone and call any one of the eleven conveniently-located Ryerson service plants. Our operators will connect you at once with an experienced service man who will see that you get the steel you need—when you need it.

JOSEPH T. RYERSON & SON, INC. Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

QUICK, DEPENDABLE SHIPMENT

TRADE PUBLICATIONS

CARBIDE TOOLS Catalog T44, issued by the Tungsten Alloy Mfg. Co., 65 Golden St., Newark 4, N. J., gives illustrations, diagrams and specifications for Tamaloy carbide tipped cutting tools, tool blanks and lathe and grinding centers made by that company. Brief descriptions of the characteristics of the various grades in which Tamaloy is supplied are given as well as suggestions as to their appropriate applications.

CASTINGS A four-page Bulletin No. 20 entitled "Meehanite—The Metal for Wear Resisting Castings" has been announced by the Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y. The bulletin illustrates and describes the various types of Meehanite which are available.

CLAMPING The Bar-Lok quick-acting pressure unit is featured in a circular offered by the Mechanics Engineering Co., Box 243, Jackson, Mich. The unit has been designed for medium and heavy duty work, and gives speedy adjustment and firm holding against vibration in jig and fixture work, machining, assembly and welding operations. This pressure unit is furnished in two series, heavy and medium duty, with two types of handles, tee and swivel, with two types of feet, square and flexible, and in three over-all lengths. A chart of code numbers and instructions is given to facilitate ordering.

CONTROLS Electron Equipment Corp., 917 Meridian Ave., South Pasadena, Cal., has released Bulletin No. 176 on its line of electronic motor controls. The controls described are to provide d.c. power from a.c. lines. Several models are illustrated and described and the principle of Varitronic control is also discussed.

COOLANT Information of value to those concerned with precision grinding is contained in the twelve-page booklet "Grinding With Oil" published by the D. A. Stuart Oil Co. The use of straight oils for thread grinding, gear grinding, and other precision grinding operations is discussed and illustrated. Requests should be addressed to the company at 2729 South Troy St., Chicago 23, Ill.

CUTTERS Ekstrom, Carlson & Co., 1439 Railroad Ave., Rockford, Ill., has released Catalog No. 43 on its complete line of cutters, router bits, rosette cutters and form cutters of various types. Also shown are special machines for routing, milling, grooving, shaping, carving and sanding plus a number of parts and accessories for the various machines manufactured.

CUTTING TOOLS A 20-page catalog that illustrates and includes specifications of a new counterbore and special high speed steel cutting tools may be secured from the Moreland Tool Co., 16935 West McNichols Road, Detroit, Mich. Among the items described are standard toolholders, counterbores and countersinks, pilots, driving bars, back spotfacers, and cemented carbide tipped cutters. Decimal and millimeter equivalent charts are also included.

CUTTING TOOLS Bulletin No. 644, covering ground thread cutting tools and hobs, has been announced by the Universal Engineering Corp., Cedar Rapids, Iowa. Standard items are illustrated and briefly described, and complete instructions for ordering are given. A section features the U-6 automatic thread milling machine.

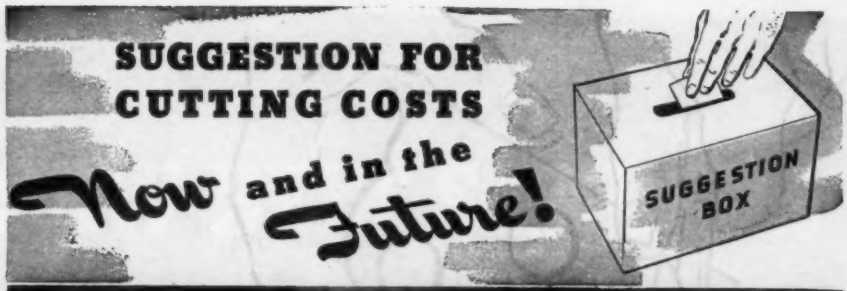
DIAMOND TOOLS Larco Diamond Tools, 551 Fifth Ave., New York, N. Y., is offering a catalog featuring a complete line of diamond tools. Full details about the tools, their uses, specifications and prices are included. The catalog also covers information on diamond powder, special tools, and metal bonded impregnated wheels and hones.

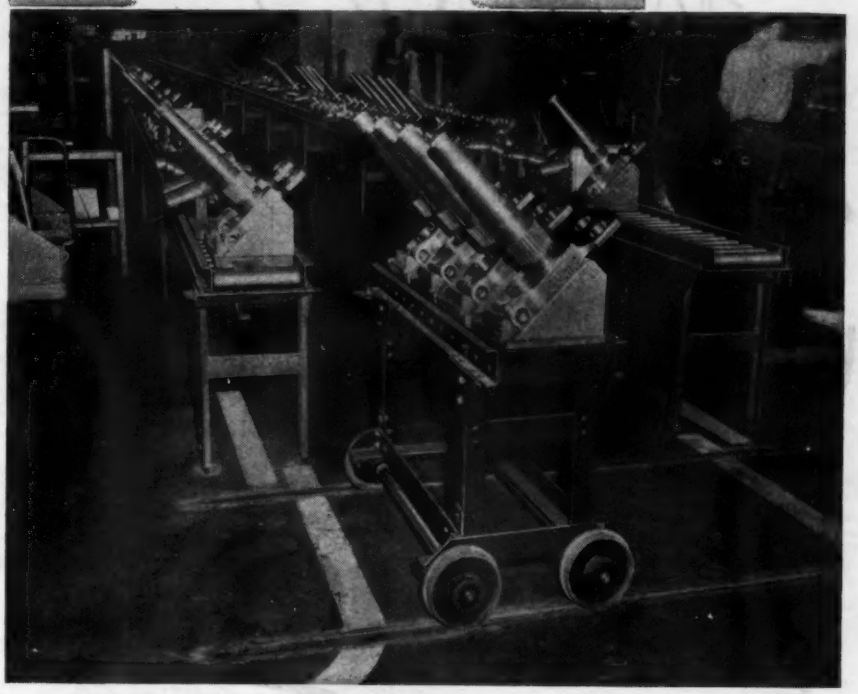
FLUID MOTORS Copies of "Oil Power Fluid Motors" may be obtained from the Pump Division, Sunstrand Machine Tool Co., Rockford, Ill. This bulletin illustrates and describes the operating principles, features, applications and engineering data of Sundstrand fluid motors.

FORGING "Evaluating the Forgeability of Steels," offered by the Steel and Tube Div., Timken Roller Bearing Co., Canton, Ohio, is a 78-page book containing for the first time recommended forging temperatures of sixty-eight steels as determined by the hot twist test conducted in the company's laboratories. The apparatus and procedures used are described and the results of tests on various steels interpreted. Requests must be made on company letterhead.

GAGES For operators of Moore gages, the Moore Products Co., H and Lycoming Sts., Philadelphia 24, Pa., has prepared Bulletin 801-S. It fully explains the principle on which the gages operate, contains general installation instructions and a step-by-step description of operational procedure, and concludes with a section on maintenance and care.

MARKING DEVICES Marquette Engraving & Mfg. Co., 3421 Lincoln Ave., Chicago 18, Ill., has isued a four page bulletin describing its line of marking devices. The bulletin illustrates and describes die inserts, roller dies, special type and type holders, special holder for embossing type, steel stamps, steel letters and figures. Also included are a group of standard stock symbols and





Look Into Everything ROLLER CONVEYORS Can Do . . . Ask STANDARD CONVEYOR

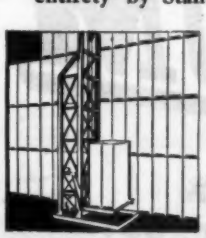
THE steps you take now — the investment in equipment that you may make to cut handling costs will not only pay dividends immediately but can be expected to yield equal or even greater returns in postwar days to come, when handling and other unproductive costs will be under the closest scrutiny.

For example, roller conveyors installed now will be useful in many ways no matter what you may be making or handling when peacetime is here. Roller conveyors are unequalled in low first cost, flexibility and minimum operating expense. They handle a wide range of commodities —parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are available in light, average, or heavy-duty types for either portable or stationary use — in a wide variety of sizes, styles and lengths. Roller conveyors are built in their entirety by Standard, including the vital bearings which are manufactured to the highest standards.

Besides roller, Standard builds belt, chain, slat, and push-bar conveyors, also spiral chutes, tiering and lifting machines, portable pilers, and pneumatic tube systems.

On any conveyor requirement Standard Conveyor is equipped by experience and facilities to recommend and furnish the right type of equipment.

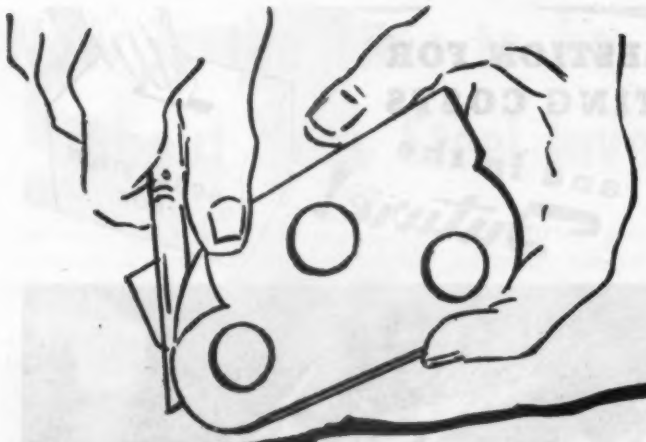
STANDARD CONVEYOR CO.
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS



save machining-grinding-filing

LAMINUM shims simply *peel* for precision adjustment, right at the job . . . release men and machines from old-fashioned shim-fitting, for more productive work.

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

Laminated Shim Company, Incorporated • 50 Union St., Glenbrook, Conn.

C-2042

it's LAMINUM TRADE MARK

THE SOLID SHIM THAT peels FOR ADJUSTMENT

symbols available in series. A size chart is included to aid in selecting correct size symbols.

NEW PUBLICATION On September 1, Western Electric Co., 195 Broadway, New York 7, N. Y., commenced publication of "The Western Electric Oscillator," formerly known as "Pick-Ups" prior to the war. The publication is edited by Will Whitmore, with Vance Hilliard as assistant. The initial issue contained 36 pages of technical and allied information of interest to broadcasting and electronic people among which was included "Radio Fights Its First War," a story telling how the men and women in that field have met their wartime duties, and "Seventy-Five Years of Pioneering by Western Electric," a two-page spread of historic pictures starting with the founding of the company and coming down to its 75th Anniversary this year.

PLASTIC COATING A catalog on Amercoat plastic coatings is available from American Pipe and Construction Co., P. O. Box 3428 Terminal Annex, Los Angeles 54, Cal. Sixteen pages of information describe the many proven uses of Amercoat in a wide range of industries, including a comprehensive list of organic and inorganic materials, foods and beverages and actual equipment and structures that are now being protected against corrosion or contamination.

POLISHING The VM-DBX and the VC-DBX abrasive belt polishing machines manufactured by Divine Brothers Co., Utica, N. Y., are presented in a bulletin announced by the company. The features, operation and application of these units are described and complete specifications are given.

PUNCHES A new standard line of electrically welded, steel plate vertical punches is announced by Thomas Machine Mfg. Co., Pittsburgh 23, Pa., in Bulletin No. 303 entitled "Vertical Punches." Thomas' line of heavier cast frame punches is also illustrated in the bulletin with closeups of floating punches, punching units, shearing attachments and special tool set-ups being shown. Tables of punching pressure and machine capacity are also given.

PUNCHING The Wiedemann Machine Co., 1819 Sedgley Ave., Philadelphia 32, Pa., has released a bulletin describing the R-44 turret punch press, for fast piercing of sheet metal through templets. Also discussed is the safe tripping mechanism which prevents piercing the templet in error, and methods of clamping the templets to the work are suggested.

PUNCHING The Dayton Rogers Mfg. Co., Minneapolis 7, Minn., has announced a new and improved weight

They're Cutting Sanding Time 83% with SKILSAW BELT SANDERS

AT DURAMOLD DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORP.

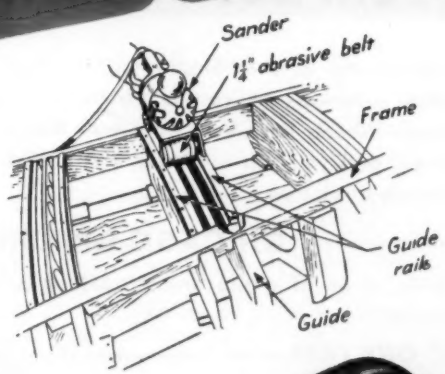
DURAMOLD Photo shows SKILSAW BELT SANDER in jig which won suggestion award for the designer, Albrecht Halbig.

A former 3 to 4 hour job for 2 men is a ONE HOUR JOB for ONE MAN with a SKILSAW BELT SANDER in a special jig

Stepping up finishing work on aircraft stabilizer frames is just one more example of how SKILSAW BELT SANDERS *do more jobs better!* In or out of a jig, on any flat and on many curved surfaces, SKILSAW BELT SANDERS do a cleaner, ripple-free finishing job faster and easier.

They pack plenty of power for round-the-clock production. They're light in weight, streamlined, handle easier in any position. And there's an extra measure of quality features in every SKILSAW BELT SANDER to give you low-cost operation longer.

If you work with wood, plywood, compositions or metal, find out the many ways SKILSAW BELT SANDERS can save time, money and manpower in your plant. Your distributor will show you on your own work. Phone him today.



4 models, belt widths 2¼, 3 or 4½ inches

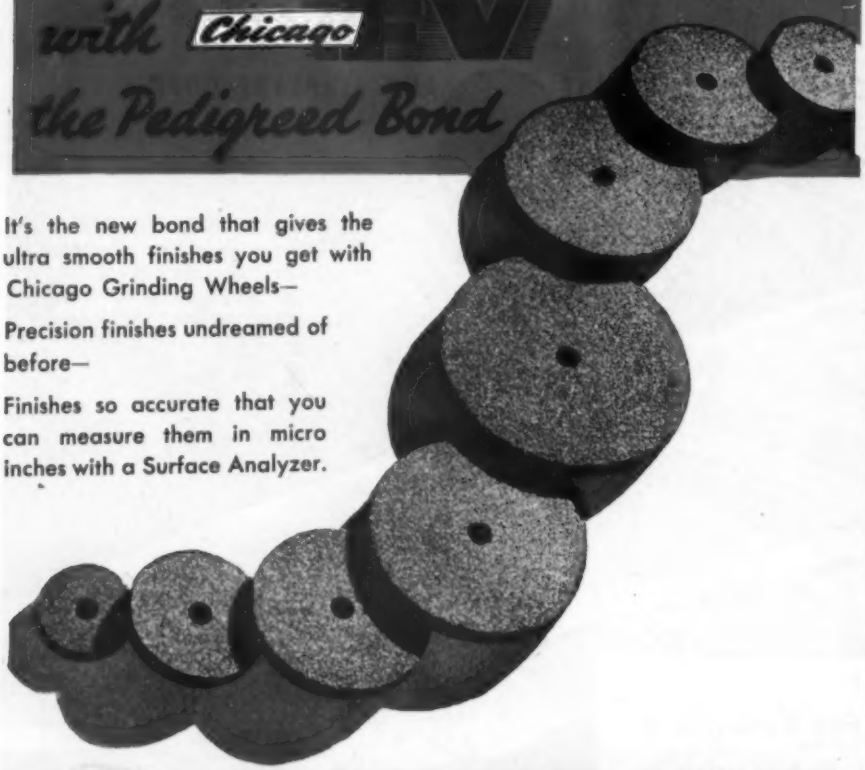
SKILSAW, INC.
5033-43 Elston Avenue, Chicago 30, Ill.
Sales and Service Branches in All Principal Cities

SKILSAW PORTABLE ELECTRIC TOOLS
MAKE AMERICA'S HANDS MORE PRODUCTIVE

BONDED

with Chicago FV

the Pedigreed Bond



It's the new bond that gives the ultra smooth finishes you get with Chicago Grinding Wheels—

Precision finishes undreamed of before—

Finishes so accurate that you can measure them in micro inches with a Surface Analyzer.

PERFECT FINISH INSURANCE

Whatever you have to finish—metals, alloys, plastics, wood, laminates or composition materials—you can do it better with Chicago Wheels.
Chicago Wheels have kept pace with the precision requirements of our war industries, and you can use them with confidence to finish civilian goods better in double quick time.

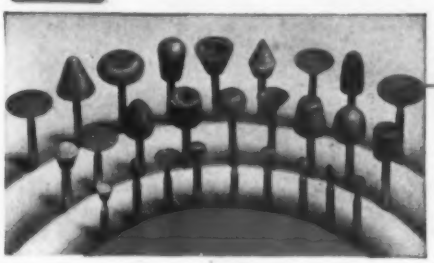
CHICAGO GRINDING WHEELS

A wide range of grains and grades and—for the duration—sizes up to 3" in diameter.

TRY ONE FREE — We'll send without charge an FV Bond Grinding Wheel or a Mounted Wheel. Tell us size you'd like.

CHICAGO MOUNTED WHEELS

The first made and the finest today. In a selection of bonds, abrasives and shapes to handle each job more efficiently.



Write for Catalog listing all Chicago products and showing comparative photographs of finishes with different kinds of Wheels.

CHICAGO WHEEL & MFG. CO.

Headquarters for Mounted Wheels and Small Grinding Wheels

1101 W. Monroe St., Dept. AT-10, Chicago 7, Ill.

*Half a Century of Specialization has established our Reputation as the Small Wheel People of the Abrasive Industry.

Send Catalog. Interested in AT-10

☐ Mounted Wheels. ☐ Grinding Wheels.

☐ Send Test Wheel. Size .....

Name .....

Address .....

calculating slide rule which automatically gives the correct weight of any sheet or strip relative to the piece part requirement as used for punching press stock. While the slide rule is primarily laid out for sheet and strip steel, there is a conversion table for sheet aluminum, copper, bronze and other sheet alloys. It will calculate sheet from ⅛ to 96 in. wide, in thickness from 0.002 to 1 in., and in lengths from ¼ in. to 1,000 ft. Requests must be made on company letterhead.

ROTARY FILES More than 72 rotary files of various shapes, both hand cut and ground from the solid, are described, illustrated and priced in "Rotary Files War Supplement" available from Grobet File Co. of America, 421 Canal St., New York 13, N. Y. The supplement lists the different sizes in which each style may be had, giving the diameter and length of cut of each.

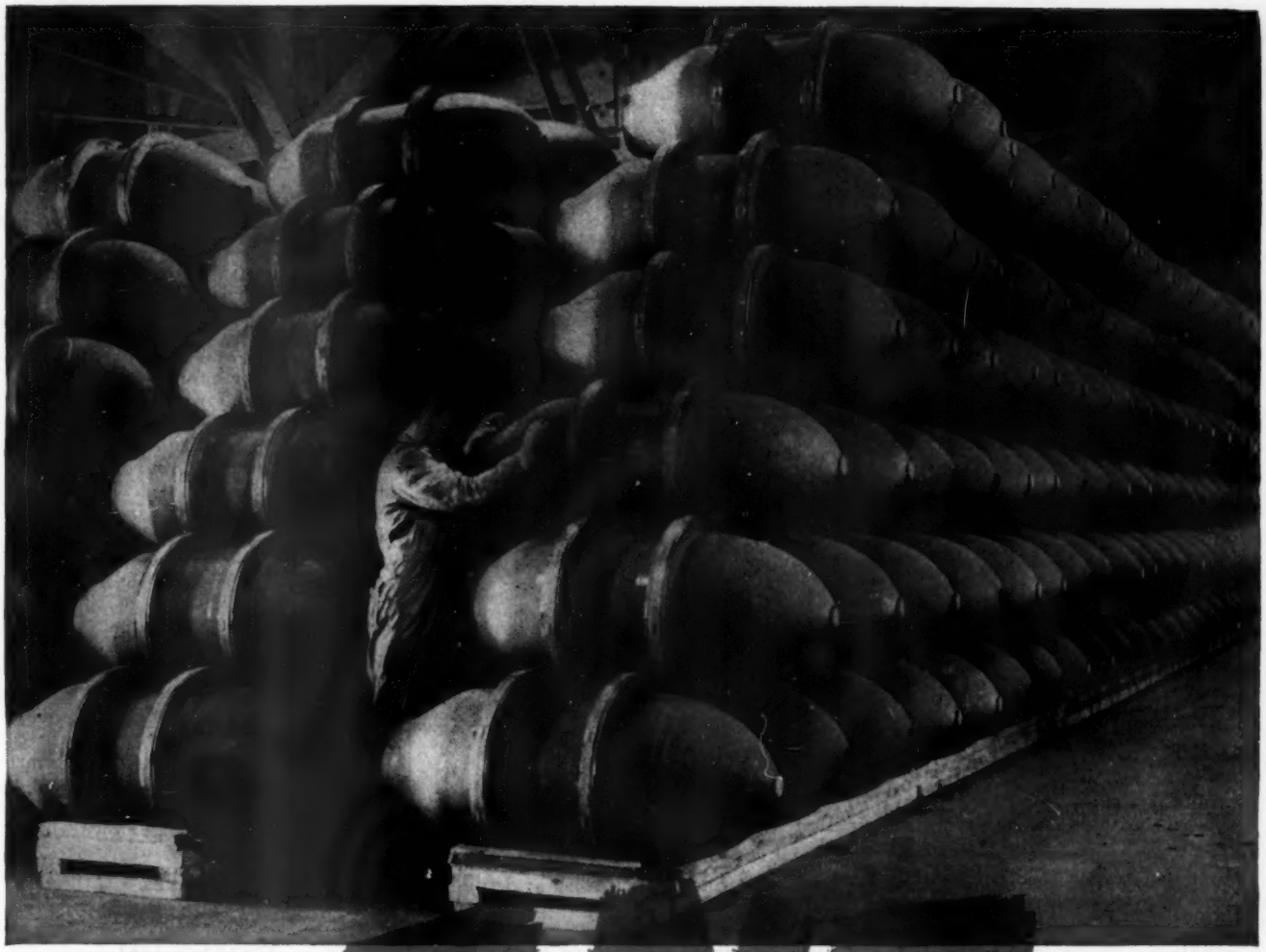
SAFETY The National Committee for the Conservation of Manpower in War Industries has issued a poster stressing sight security. Copies may be had by addressing requests to V. A. Zimmer, Director, Division of Labor Standards, U. S. Department of Labor, Washington 25, D. C.

SAFETY Resistoflex Corp., Belleville, N. J., has published a 16-page catalog on its "Featherweight" and heavy-duty protective garments made of the solvent-proof transparent compar plastic. The catalog also includes a section on cleaning, maintenance and repair of Resistoflex garments and a statement from the U. S. Public Health Dept. recommending plastic garments of the Resistoflex type.

SHEARS The Quickwork Division of Whiting Corp., Harvey, Ill., has printed Bulletin QW-120, featuring the applications and operation of attachments used on rotary shears. Circle cutting, slitting, joggling and flanging attachments are discussed.

TAP SHARPENING The new improved Detroit tap reconditioner, on which all operations necessary for keeping taps in condition can be quickly and accurately performed, is described in a four-page Bulletin No. DTR-3 offered by the Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich. The bulletin tells how this machine has been made into a "4-in-1" machine by adding to its original functions, of chamfering, spiral pointing and spiral point polishing, the facilities for sharpening the entire tap by grinding the full length of its flutes. The bulletin includes instructions for each one of these operations.

TOOL GRINDING K. O. Lee Co., Aberdeen, South Dakota, has published a 24-page booklet on its line of universal tool grinders. In addition to illustrating and describing the various



all set for T.N.T.

POWERFUL TNT, for which endless rows of bomb cases are waiting, looks and pours in a thick, yellow stream . . . a deadly, 1000-lb. "yolk" for each of these bomber "eggs".

Machining operations in the manufacture of munitions range from rough hogging of steel to delicate jobs of watchmaker precision, as on fuses. In all of them, Texaco Cutting and Soluble Oils assure faster machining, longer tool life.

Texaco Cutting Oils, for instance, permit higher speeds and feeds, with improved surface finish. They lubricate the tools, and by carrying away the heat prevent chip welding; thus lengthening tool life, assuring greater output.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

The services of a Texaco Engineer, specializing in cutting coolants, are available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

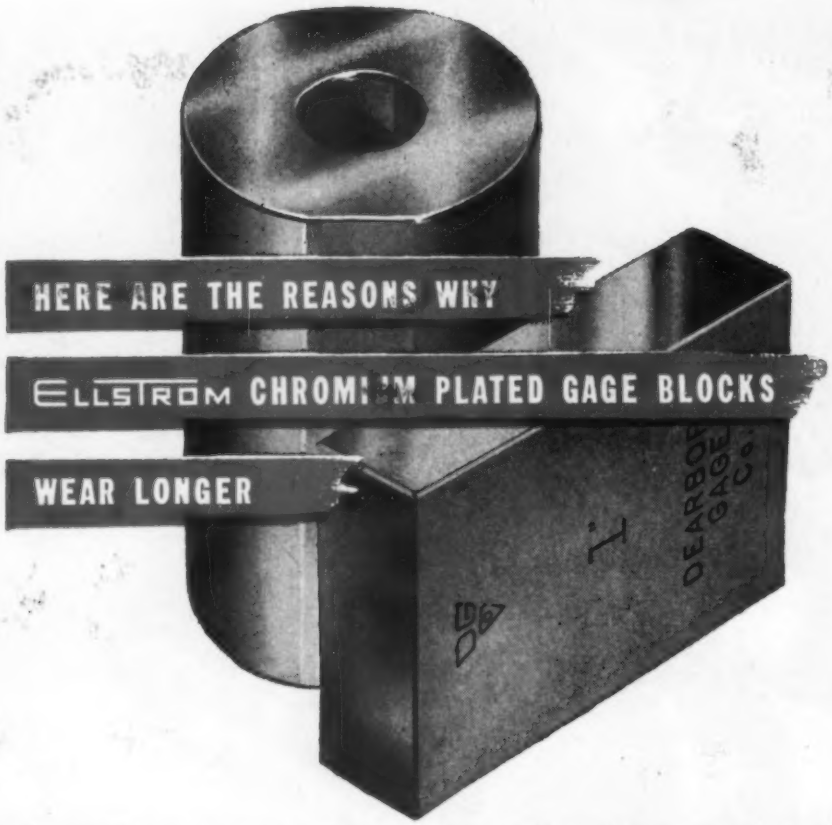
★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



CHROMIUM PLATING offers excellent resistance to wear principally because of its extreme hardness. Chromium is accepted as having a value of 1000 Brinell with a No. 9 position on the Mohs scale. The diamond is No. 10.

Sometimes chromium plate does not offer adequate protection to the base metal, however, when this occurs, it is generally evident that the coating is too thin or the plating procedure itself is at fault.

BECAUSE ELLSTROM GAGES ARE **CORRECTLY PLATED** ***AND UNCONDITIONALLY GUARANTEED ACCURATE,*** **all Ellstrom-made chromium plated gage blocks successfully resist the corroding effects of moisture or acids. This means still longer wear with greater precision.**

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

TOOL MAKERS—Here's an Ellstrom-made gage block set for your own personal use. Chromium plated for longer wear. The best set that money can buy. Six blocks in the following sizes—.0625, .125, .250, .375, .500 and 1" contained in a hand-rubbed walnut case. Write for prices.

models, the catalog gives complete information on their operation and application as well as specifications, speeds, accessories and standard equipment available.

SEEN and HEARD

By JOHN R. GODFREY

Standardizing Carbides

USERS OF CARBIDE and other cutting tools are asking the makers of the different brands to standardize their designations so that users can guess somewhere near the equivalents in tools of various makes. It's the old abrasive story over again. What grit and grade of *A* Company gives approximately similar results as a certain abrasive of another company? We've made a stab at standardizing these in the compromise grading to help the war effort. And it seems to have helped to some extent.

No one expects to exactly duplicate wheels in different makes. But any move in that direction helps and should be encouraged. The growing use of carbide cutters makes it all the more necessary to have some sort of standardization in grade to aid in selecting the best kinds for different work.

Standard Test For Lubricating Oils

EVERY OIL has certain basic properties which can be checked to see if these properties are unchanged in successive purchases. These properties include viscosity, flash and fire point, pour point, carbon residue, neutralization number, specific gravity and viscosity index.

Viscosity is considered the most important property of oils. It is defined as the resistance to distortion offered by a fluid, because of its cohesion or internal friction. A heavy-bodied oil, for example, is high in viscosity. The instrument used in the United States for determining viscosity of mineral lubricating oils is the Saybolt Universal Viscosimeter (S.U.V.). The viscosity of an oil, expressed in seconds, is the time required for 60 milliliters of the liquid to flow through the standard aperture of the instrument at a stated temperature, usually at either 100 F. or 210 F. Actually, the oil is caught in a flask accurately marked off at 60 milliliters. For very heavy oils, the Saybolt Furol Viscosimeter is often used. Multiply Furol seconds by 10 to obtain approximately Saybolt Universal seconds.

Flash point of an oil is the temperature at which it will first give off sufficient vapors to ignite when approached by a small flame or spark. The fire point is the lowest temperature at

which, when ignited, the oil continues to burn. The apparatus used to determine this in the United States is the Cleveland open cup tester. The oil under test is heated and a small pilot flame is moved over the cup with every 5 F. rise in oil temperature. Flash point indicates the ordinary fire hazard in handling oils and also is specified high enough to avoid undue evaporation losses in service.

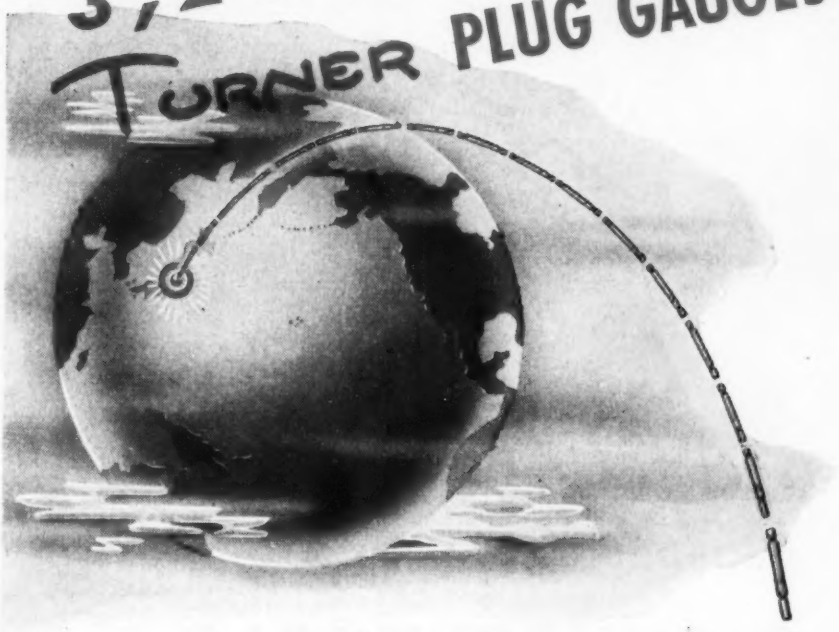
The pour point of an oil is the lowest temperature at which it will flow when chilled without disturbance. The test is made by chilling the oil in a 4-oz. sample bottle. At every 5 F. drop in temperature, the bottle is tilted enough to see if the oil is still fluid. When the oil shows no movement when the bottle is held horizontally for five seconds, this is the "non-fluid" point. The pour point is designated as the temperature 5 F. above this point. It is an indication of the point below which oil may not flow in gravity lubrication systems, but does not show the tendency to "channel" at temperatures below the pour point.

The carbon residue is the amount of carbon which remains after an oil has been evaporated under certain conditions of high temperature and under exclusion of air. A sample of the oil is heated in a crucible and the oil vapors allowed to burn. Then the heat is raised until the remaining liquid is driven off. The carbon residue is the weight of carbonaceous material left in the crucible expressed in percentage of the original weight of the oil. Paraffin base oils will give much higher percentages than naphthenic base oils. This test is of no significance for oils used in enclosed and open gearing.

The neutralization number of an oil is defined as the weight in milligrams of potassium hydroxide (KOH) solution required to neutralize the acid constituents in 1 gram of oil. It is measured by mixing a definite quantity of oil with a mixture of equal parts of alcohol and distilled water, agitating and heating to boiling. An indicator is added and standard potassium hydroxide solution is run in until the end point is reached as shown by the appearance of a pink color in the alcohol-water layer. This test is an indication of the presence of corrosive mineral acids in harmful quantities. A maximum neutralization number of 0.1 is usually set for the type of oils used in lubrication of inclosed and open gearing. Any change in the neutralization number in an oil in service indicates that a change has taken place in the oil. Most gear oils should be changed if the neutralization number increases, depending on the characteristics of the oil, 0.10 to 0.50 above that of new oil.

The specific gravity of an oil is a value expressing the weight of a known volume of oil. In the oil industry it is measured by a hydrometer graduated on the American Petroleum Institute scale and reported as gravity in degrees A.P.I. It can also be re-

3,286,212 TURNER PLUG GAUGES



. . . are hitting the target!

We don't know how many plug gauges laid end to end it would require to reach Tokyo or Berlin, but we do know that we made 3,286,212 steel and chrome plug gauges to check many types of war implements that do reach our military objectives.

Yes, *precision* has become the watchword of industry during this war, and it will continue to be a factor in those industries that will be the leaders in peacetime production.

★ Remember the name Turner when you think of Precision.

TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY
2625 HILTON ROAD • • • • FERNDALE, MICH.

Types of Gauges we make

Cylindrical Plug Gauges, Plast-O-Lock Plug Gauges, Cylindrical Ring Gauges, Special Flush Pin Gauges, Solid Type Snap Gauges, Master Discs, Built Up Gauges

★ ★

Standard of Dependability

"YANKEE" TOOLS

Standard the world over for more than half a century, "Yankee" Fine Mechanics' Tools—Spiral Screw Drivers, Tap Wrenches, Automatic Drills, Bit Braces—are saving vital man-hours on every conceivable sort of wartime production. They'll work at reconversion one of these days, and then again on production of the peacetime goods of private enterprise. They save man-hours by being deliberately and ingeniously designed to do precisely that. So remember "Yankee" Tools as time, trouble, and money savers when they are again readily available after Victory has been won. Order from your industrial supply distributor, or write North Bros. Mfg. Co., Dept. AM-1044, Phila., Pa. Furnish priority ratings whenever possible, and every effort will be made to fill your orders.

"YANKEE" SPIRAL SCREW DRIVER NO. 130A
A Size for Every Purpose

"YANKEE" TOOLS
make good mechanics better
North Bros. Mfg. Co., Phila. 33, U. S. A.
Established 1880

ported as degrees Baume which corresponds very closely to the A.P.I. degrees or as specific gravity and will differ depending on the base of the oil tested. In general, the specific gravity of a paraffin base oil will vary from 0.86 to 0.89, a mixed base oil from 0.89 to 0.92, and a straight naphthenic base oil from 0.92 to 0.94, but this cannot always be relied upon to distinguish between oils of various bases. A more reliable indication might be viscosity index or flash and fire.

Viscosity index is an empirical number indicating the effect of change of temperature on the viscosity of an oil. A low viscosity index signifies relatively large change of viscosity with temperature. Viscosities are usually taken at 100 F. and 210 F. and a line is drawn between these two points on a viscosity index chart or the viscosity index can be calculated from a formula and table given in American Society for Testing Materials standards on Petroleum Products and Lubricants. Paraffin base oils have V.I.'s from about 70 up, mixed base oils from about 40 to 70 and naphthenic base oils from 0 to 40. Where there is considerable range in operating temperature, gear lubricaiton practice has specified a viscosity index of 60 as a minimum value and for ordinary use a minimum of 20.

Paraffin base oils have high flash and fire points, high V.I., high pour tests, low specific gravity and high carbon residue. Naphthenic base oils have lower flash and fire points, low pour tests, high specific gravity and low carbon residue. Mixed base oils or Mid-Continent oils will have properties ranging between the values of each of the two groups.

A compounded oil is a mineral oil that has a certain percentage of an animal oil such as acidless tallow or lard oil blended with it to obtain a greater degree of lubricity. It is recommended for certain worm gears.

Deterioration of oils can be attributed to many causes. The most common is subjecting the oil to too high a temperature. The presence of certain metals such as copper and its alloys will quicken the oxidation of oil, especially if heat is also present. Oxygen or ozone, as well as water, are bad influences. The oil finally becomes acid and undesirable sludges are formed.

An extreme pressure (E.P.) lubricant is an oil which contains special additives to enable it to carry heavier loads than a straight mineral oil or a compounded oil will carry. Two types are recognized, defined as powerful and mild E. P. lubricants. Only the mild lead naphthenate variety is advocated for gear uses. These E.P. lubricants should only be used where specifically needed.

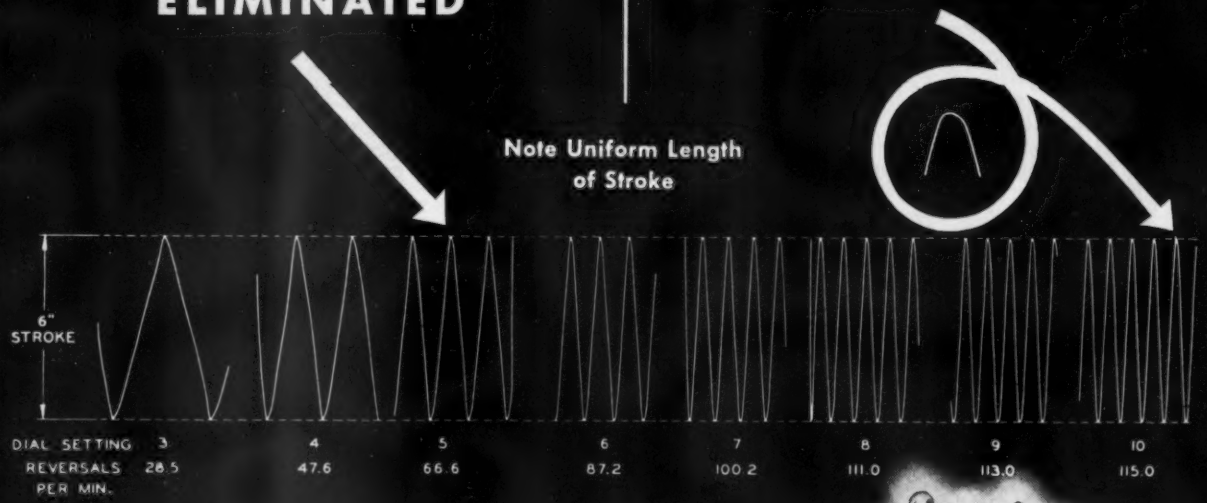
Not every lubricant that is a liquid is an oil. Some soap thickened oils which are really greases may be fluid.

From a data sheet prepared by the Lubrication Committee of the American Gear Manufacturers Association.

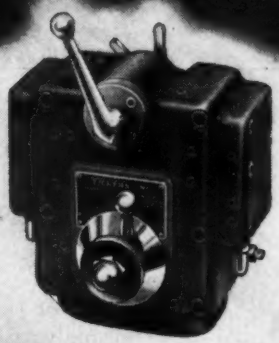
For Machines Requiring Continuous Reciprocating Cycles:

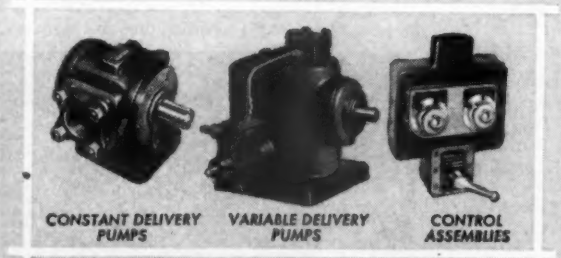
OVERRIDE PRACTICALLY ELIMINATED

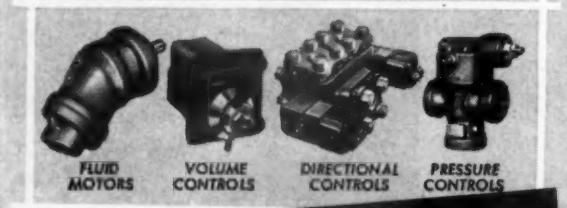
SMOOTH REVERSALS AT ALL SPEEDS



VICKERS "RECIPROCATING CYCLE" CONTROL PANELS







This is a complete self-contained control unit for grinding machines, honing machines, or any process requiring a continuous reciprocating cycle.

The curves reproduced above were accurately made by a stylus attached to a reciprocating head and tracing upon a recording mechanism. Note uniform stroke length regardless of large changes in head or table speed. Throughout the test the setting of reversing trip dogs remained unchanged. An integral Vickers Hydrostatic Compensator makes flow rate (and therefore rate of reciprocation) independent of variations in resistance encountered. Similar tests and many installations show that at other speeds, loads and stroke lengths the same smooth reversals and accurate stroke length control are maintained.

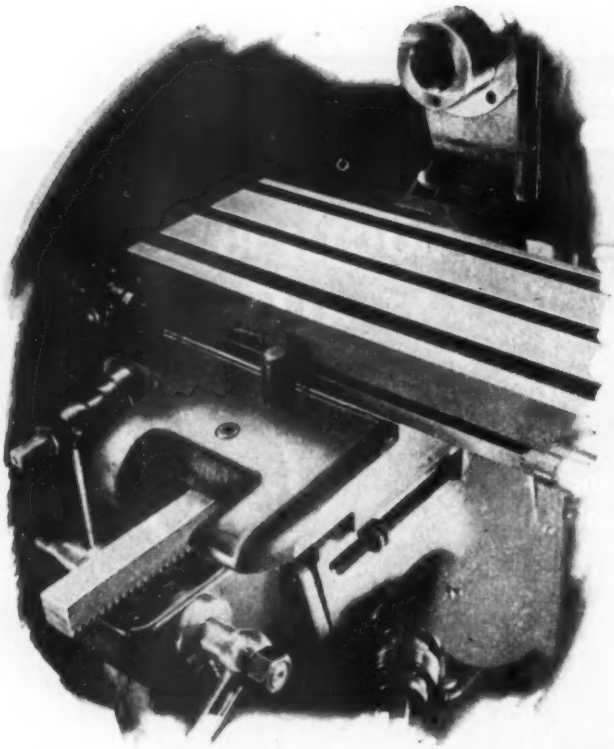
Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

Representative of More Than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

VICKERS Incorporated

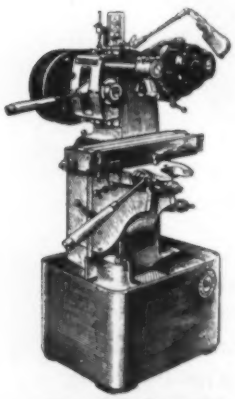
1410 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER



LATHE CARRIAGE FLEXIBILITY

KEEPS NICHOLS MILLERS BUSY



Precision turning, boring, recessing, jobs you'd normally assign to toolmaker's lathes or expensive boring machines, come natural to Nichols Millers.

Lever-Rack-and Pinion Transverse Feed is the answer. This exclusive Nichols development assures the *extra-utility* that makes the Nichols Miller *different* from conventional hand millers. It adds lathe-carriage flexibility to your most intricate machining operations while maintaining tolerances to "tenths." Work can be chucked lathe-fashion on the spindle with tools mounted on the table or vice versa.

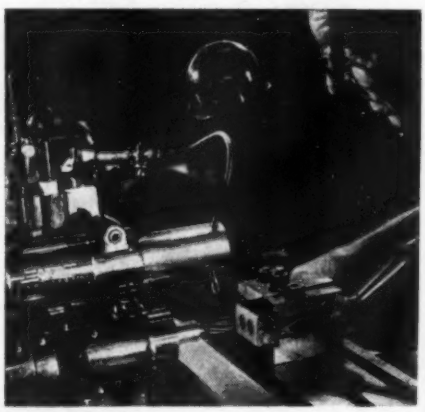
Simple fixtures, made possible by the rise-and-fall spindle, reduce set-up time, even in the hands of semi-skilled operators on production lines, in toolrooms and laboratories.

Our new brochure will help you visualize how the Nichols Miller can fit your production scheme, now and for reconversion. Send for it today.

ALL NICHOLS MILLERS ALL DIFFERENT JOBS

Milling Two Slots Inside a Ring. Slots are accurately located in relation to one another and to drilled master holes.

Precision Boring. Here the Nichols Miller with Rack and Pinion transverse feed is being used to bore a ±.0002" tolerance on a 3" diameter.



Reaming Two Holes to precise location within ±.0005". This job is done with two rack and pinion feeds and a quick-action work holder.

THE NICHOLS MILLER

"THE MILLER THAT USES ITS HEAD" • MFD. BY W. H. NICHOLS & SONS, WALTHAM, MASS.

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP. • 40 CHURCH ST., NEW YORK 7, N. Y. • *Dealers in all principal cities*

AUTO-LITE DIE CASTINGS

...Dependable Fighters for Freedom

Auto-Lite Die Castings are the choice of engineers for the most exacting requirements, for example, parts for automatic pilots and flight indicating instruments.

Long experience in the die casting art and in die design results in castings of uniform density capable of passing rigid X-ray inspection. As a result, Auto-Lite die castings are in great demand as parts for intricate mechanisms of aviation precision instruments.

Zinc and aluminum die casting, machining and finishing facilities are combined under one roof at the Auto-Lite Die Casting plant. Equipment of the most modern type is used.

Within the limits of today's wartime demands, Auto-Lite will be glad to put its wide experience at your service in adapting and producing die castings to meet your individual requirements.

BUY WAR BONDS

THE ELECTRIC AUTO-LITE COMPANY

600 South Michigan, Chicago, 5 — *Die Casting Division* Woodstock, Illinois — 723 New Center Building, Detroit, 2

Auto-Lite Die Castings facilitate mass production of this Directional Gyro Control unit of the Gyropilot.

TUNE IN AUTO-LITE'S GREAT RADIO SHOW, "EVERYTHING FOR THE BOYS" — EVERY TUESDAY NIGHT — NBC NETWORK

WHEN YOU TAKE THE TOOL *to* THE JOB

TAKE A HASKINS

There's only one answer where a portable tool of constant power is indicated—Haskins Flexible Shaft Equipment. Light and easy to handle, yet sturdy and dependable, it will turn out more work and better work—faster. Fatigue is negligible. Thirty models, each capable of handling many different jobs. Write today for your copy of Catalog 45. R. G. Haskins Company, 2760 W. Flournoy Street, Chicago, Illinois.

RB-4
¼ H. P. motor, direct drive, 3425 R. P. M. Bench plate mounting, 360° ball bearing swivel. Light duty.

HASKINS

HASKINS
Flexible Shaft
EQUIPMENT

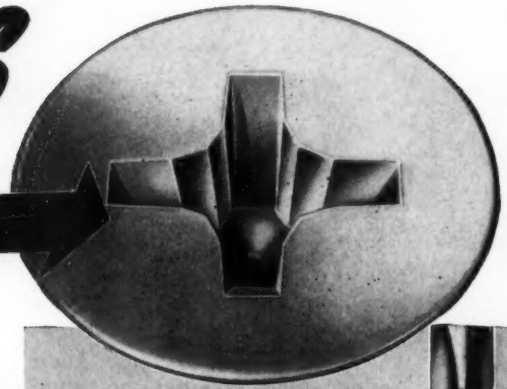
More VERSATILE Machines for More PROFITABLE Work

AS A WEAPON FOR KNOCKING PRODUCTION COSTS DOWN

IT'S HARD TO MATCH THIS→

THE SCREW WITH THE ENGINEERED RECESS THAT STEPS UP SCREW DRIVING SPEED AS MUCH AS 50%

→→→ IT'S PHILLIPS



THE ENGINEERED RECESS

Right at your command is one of the most potent and efficient weapons for speeding up assembly and cutting costs that you could hope to find.

It's Phillip's – the Engineered Recessed Head for all kinds of screws.

It's the screw recess that eliminates fumbling, wobbly starts, slant driving, and dangerous skids – the troubles that have long made screw driving slow, awkward – and costly!

It's the screw recess that makes driving easier for workers – helps keep them going at top speed through a full shift.

It's the screw recess that lets you adopt spiral and power driving for assemblies where speed tools have never been practical.

Hundreds of plants have increased screw-driving speeds as much as 50% . . . and cut costs correspondingly . . . simply by switching to Phillips Recessed Head Screws. Can you do the same? Make the switch to Phillips Screws now – and you'll see. You'll see they cost *less* because they help you produce much *more!*

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

TO MAKE WARTIME QUOTAS AND PEACETIME PROFITS

Faster Starting: Driver point automatically centers in the Phillips Recess . . . fits snugly. Fumbling, wobbly starts, slant driving are eliminated. Work is made trouble-proof for green hands.

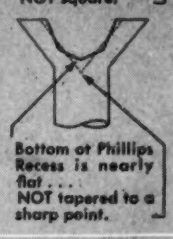
Faster Driving: Spiral and power driving are made practical. Driver won't slip from recess to spoil material or injure worker. (Average time saving is 50%.)

Easier Driving: Turning power is fully utilized. Workers maintain speed without tiring.

Better Fastening: Screws are set-up uniformly tight, without burring or breaking of screw heads. The job is stronger, and the ornamental recess adds to appearance.

IDENTIFY IT!

Center corners of Phillips Recess are rounded . . . NOT square.



Bottom of Phillips Recess is nearly flat . . . NOT tapered to a sharp point.

24 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoli Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Wolverine Bolt Co., Detroit, Mich.

BECAUSE the name Acme Pattern & Tool Company, Inc. no longer adequately describes the scope of our operations, we are changing our corporate name to Acme Aluminum Alloys, Inc.

This marks the second time we have changed our name to keep pace with the remarkable growth which this company has made since its beginning less than 25 years ago.

Our production of aluminum alloy castings . . . permanent mold and sand . . . has grown to such volume, that in floor space, equipment and output the Acme foundry today ranks among the first four or five aluminum foundries in the United States.

Our pattern, tool and die departments, and our design and engineering service, continue unchanged, but will operate as the Acme Pattern & Tool Division of Acme Aluminum Alloys, Inc.

We shall be glad to submit recommendations and estimates on your current or future aluminum castings requirements.

FOR VICTORY
BUY
WAR BONDS
AND STAMPS

ARMY E NAVY

ACME *Aluminum Alloys, Inc.*

DAYTON 3, OHIO

HEAT-TREATED ALUMINUM ALLOY CASTINGS

ACME PATTERN & TOOL DIVISION

PATTERNS · TOOLS · TOOL DESIGNING · PRODUCTION PROCESSING

"**BLUE BRUTES,**" Worthington calls them. They're the line of rock drills, paving breakers, other construction air tools and portable air compressors. The work they do is as tough and shattering as any found in industry.

Fastening such equipment is no job for ordinary nuts. They couldn't last. But Elastic Stop Nuts are O.K. They stay put, come what may in the line of socks and vibration. That's why "Blue Brutes" are fastened with them.

The reason Elastic Stop Nuts hang on like this is found in the elastic collar in their tops. This collar wraps itself around the bolt—squeezes in between the threads—presses up, down and all around. The nut can't turn—can't wiggle.

There's no need for locking pins or washers with Elastic Stop Nuts. And they can be taken off and reused without losing their locking ability.

There are countless products that will be safer and last longer—machinery that will need less servicing—when fastened with these nuts. Perhaps you have some such problem now. If so, let us know. Our engineers will gladly share their experience with you and recommend the correct Elastic Stop Nut.

Note: ESNA nuts are also used on Worthington centrifugal pumps.

Sinews for Worthington "Blue Brutes"

TAKE IT FROM THE MAN WHO KNOWS

In the past, one of our most serious difficulties was the loosening of the nut fastenings on our rock drills, paving breakers, and other compressed air operated construction tools. Some of these tools operate at high piston speeds with resultant vibratory stress on the rods and nuts that hold the component parts together.

Our present use of ESNA Elastic Stop Nuts for the major fastenings on this equipment is the result of exhaustive tests of many types of fasteners. It was found that these nuts hold tight under extremely severe conditions of service and that they retain their satisfactory locking effectiveness even after long periods of operation in the field.

Engineer in Charge Contractors' Air Tools and Rock Drills Worthington Pump and Machinery Corporation

LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR.
THE COLLAR IS ELASTIC, THE NUT CAN BE USED TIME AND TIME AGAIN.
MADE IN ALL SIZES AND TYPES—WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS.

ESNA

TRADE MARK OF
ELASTIC STOP NUT CORPORATION OF AMERICA

ELASTIC STOP NUTS

Lock fast to make things last

UNION, NEW JERSEY, AND LINCOLN, NEBRASKA

McCASKEY—PRODUCTION CONTROL THAT KEEPS PRODUCTION MOVING

Shown here is a typical installation of McCaskey Production Control and a suggestion of what it accomplishes specifically in the plant of Federal Manufacturing & Engineering Corporation, Brooklyn, N. Y. This company, prior to Pearl Harbor, manufactured the nationally known Federal Photographic Enlarger. Today, its five hundred employees are busy 100% on war work.

The Army-Navy E award, followed by three White Star awards, is indicative of the high standard of production efficiency set and maintained in this plant.

To quote Mr. E. N. Reynolds, Manager of Production and Planning Control, "Our jobs are constantly changing. McCaskey Production Control provides such flexibility that, regardless of the length of the job, we know where production stands at all times. It gives us a constant check of every phase of production, movement of materials and operations."

(Above)—Central control of production providing the status of every part in process by operations and departments. Prompt collection and filing of copies of time and move tickets with shop orders, constitute a record that is complete and up-to-the-minute. Orders that are behind schedule stand out as requiring special attention. A glance at the Control Boards gives a complete picture of the progress of any job in the shop without reference to any other source of information.

(Left)—One of several departmental controls where employees receive job assignments and individual time tickets and corresponding shop orders are retained, showing the job on each machine and the following job or jobs. Also provides foremen with simple means for assigning jobs to employees and machines best adapted for them, in accordance with schedule requirements.

(Right)—Job costs and inventory of parts placed in stock, awaiting completion or assembly. Costs are secured by accumulating copies of job time tickets provided without extra writing, eliminating the clerical operation of making a posted record. Inventory data are recorded by filing copies of tickets issued to accompany parts moving to stock. "One writing" and visible filing provide these essential records with a great saving of time and clerical work.

A McCaskey representative will gladly explain how a McCaskey Production Control System can be applied in your plant to speed production.

McCaskey Systems Ltd., Galt, Ontario, Canada

The McCaskey Register Co., Watford, England

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

That Century Motor may be out of sight, but it is always ready to give smooth, dependable, quiet performance.

CENTURY MOTORS

Unusual Freedom from Vibration is a Vital Part of the Performance of Any Machine

Quiet and unseen in thousands of applications, particularly on machine tools, Century Motors are the dependable servants of the machine operators. They start quietly, run quietly, and with an unusual freedom from vibration that contributes much to precision workmanship.

Today, under the rigid demands of Wartime production, Century is developing even finer motors than we have made in over forty years of manufacturing—motors that correctly match the demands of the machine and which are properly protected against surrounding conditions as well.

The Century Engineer nearest you will gladly help you select the correct motor for your application. Call him in today.

CENTURY ELECTRIC COMPANY

1806 PINE ST. • ST. LOUIS 3, MO.

Offices and Stock Points in Principal Cities

390

EXAMPLE OF *Service*:

A Cities Service Lubrication Engineer,
called in by a large war plant, suggested certain
changes in threading operations . . . recommended a new
transparent blend of Cities Service Cutting Oil . . . and
thus almost tripled the number of pieces per grind.
SUGGESTION: For another "Example of Service," write for
your free copy of *Metal Cutting Fluids*, replete with helpful
information. Address: Cities Service Oil Company,
Sixty Wall Tower, New York 5, N. Y.

More and more, it's service that counts . . .

and *Cities Service* means good service!

CITIES SERVICE OILS
ONCE-ALWAYS
CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY

BAKELITE

TRADE-MARK

WHAT THE ALIDADE MEANS
to the "Lookout Men" of War and Industry

Produced by Daystrom Corporation. Molded Parts by Northern Industrial Chemical Company.

Split seconds count when an enemy craft is sighted. Every lookout brings his binoculars to sharp focus and reports the bearing shown on his Mark V Surface Lookout Alidade. From these readings, fire control can compute the range, whereupon our ships' guns swing for action.

Alidades were formerly machined by skilled labor from then critical metal, but the time came when their production had to be vastly stepped up. The Navy turned to BAKELITE plastics—with results that point the way to product improvement and production economy for the "lookout men" of industry. The new alidade, molded from BAKELITE *impact-resistant* phenolic materials is produced four times faster than its predecessor—costs are reduced 50 per cent—corrosion is wholly eliminated.

The success of the alidade was assured because designers, fabricators, and Bakelite Plastics Headquarters worked together as a co-ordinated team. Similarly, your products can benefit from the same teamwork, and from the employment of a BAKELITE plastic material with the exact properties to meet your individual requirements.

If you have a problem affecting essential production, our Development Laboratories and technical representatives will be glad to work with you. If you are planning for the future, write for Booklet IM.

TRADE MARK

BAKELITE CORPORATION

Unit of Union Carbide and Carbon Corporation

30 EAST 42ND STREET • NEW YORK 17, N. Y.

UCC

PLASTICS

So WAR NERVES caught up with #681— he couldn't guess-count on that high-speed run!

That coil-winder ran him ragged! No matter how he watched and tried to count, the machine would outguess him, and he'd shut it down only to find another overrun or another shortage. So they finally had to count him out, and call for the boys in the white coats.

Veeder-Root INCORPORATED HARTFORD, CONN.
TRADE MARK REG. U.S.A. PAT. OFF.
FORM W-6735-6-1
MADE IN BRISTOL, CONN. U.S.A.
U.S.A. PAT. NO. 2040025, 2040026, 2040027, 2150314
OTHER PATS. PEND.

Here's how to put him back on the job:

Equip that coil-winder with a Veeder-Root High-Speed Predetermining Counter . . . then all he'd have to do would be to set the predetermining wheels to the number of strokes, turns, or pieces required for the run . . . throw the starting switch . . . and forget it or do other work. At the end of the run the counter will signal him with a bell or light . . . or actuate a mechanism to stop the machine right on the button. No more anxious useless watching . . . no more "*war nerves*" . . . for No. 681. The counter shown is one of scores of types of Veeder-Root Devices which can be quickly and easily installed on any production machine or process, to count in any terms and units . . . and thus tighten control, prevent errors, delays and waste, *and make it easier for workers to do more work*. See what Veeder-Root "Countrol" can do *in your own plant*. Write to:

The Counting House of Industry

77204

VEEDER-ROOT
INCORPORATED
Hartford 2, Connecticut

In Canada: Veeder-Root of Canada, Ltd., Montreal
In England: Veeder-Root Ltd. (new address on request)

SEND FOR THIS FREE BOOKLET

Find out how you can use this CHASE COPPER ALLOY that's almost as easy to machine as free-cutting brass, and has an electrical conductivity that averages 90% of pure copper!

READ how Chase Tellurium Copper makes it possible to produce electrical parts and other similar pieces at a high production rate *without a major sacrifice of conductivity*... how it eliminates the bottleneck of producing parts from tough-to-machine copper!

Here, in booklet form for quick, easy reference is the complete story of this unique alloy developed *and patented* by the Chase Brass & Copper Co.—for use in the aeronautical industry, the electrical, radio, communications and similar fields.

Learn more about the copper alloy with a machinability rating close to that of free-cutting brass, and an electrical conductivity that averages 90% of pure copper. The properties, machinability, advantages and recommendations for buying Chase Tellurium Copper are all given in this booklet. Send for your free copy. Find out how you can use this unusual copper alloy.

CHASE

CHASE BRASS & COPPER CO.

Incorporated
Waterbury, Connecticut

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

ALBANY †, ATLANTA †, BALTIMORE, BOSTON, CHICAGO, CINCINNATI, CLEVELAND, DETROIT, HOUSTON, INDIANAPOLIS †, KANSAS CITY, MO. †, LOS ANGELES, MILWAUKEE, MINNEAPOLIS, NEWARK, NEW ORLEANS, NEW YORK, PHILADELPHIA, PITTSBURGH, PROVIDENCE, ROCHESTER †, SAN FRANCISCO, SEATTLE, ST. LOUIS, WASHINGTON †

† *Indicates Sales Office Only*

This is the Chase Network—handiest way to buy brass

STA-KOOL
TOOL HOLDER

This new, patented diamond tool holder provides a fast, accurate method of meeting every requirement in dressing and truing operations. Equipped with internal coolant ducts for wet grinding, and external cooling fins for dry grinding, metal setting as well as stone are kept at safe operating temperatures, eliminating diamond breakage, due to overheating. Thus, tool life is increased, resulting in savings from 30 to 50% in diamond dressing and truing costs. For finish-dressing SMITITE Diamond Tools are available, in which the stones may be completely consumed without resetting. ***Catalog on request.***

J. K. SMIT & SONS

157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.

ZINC COATED

Thomas Strip

COLD ROLLED STRIP STEEL

Spun, Drawn, and Formed

The crackproof, peelproof finish of zinc coated Thomastrip will adhere to the steel to the limits to which the base metal is drawn. Available in various weights of coatings, in coils or cut lengths, dull or bright finish with uniform coating on both sides, and having temper ranges from soft to full hard, Thomastrip electro-coated with zinc will meet a wide variety of product and production requirements. This durable coating provides a non-porous final finish, aids die life, and is suitable for spot welding and soldering operations. Coated edges can be furnished on wide or narrow strip including flat wire.

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED — IN COLORS

THE THOMAS STEEL CO. • WARREN, OHIO

SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

WYCKOFF *Precision* COLD FINISHED STEELS

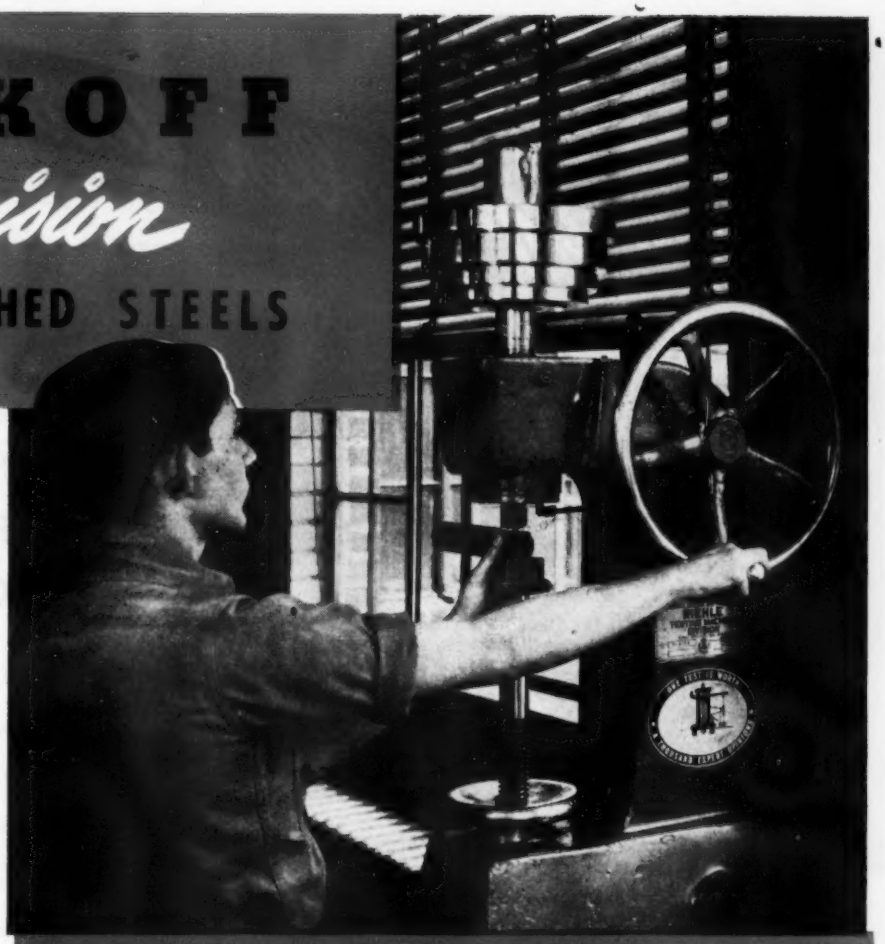
FOR

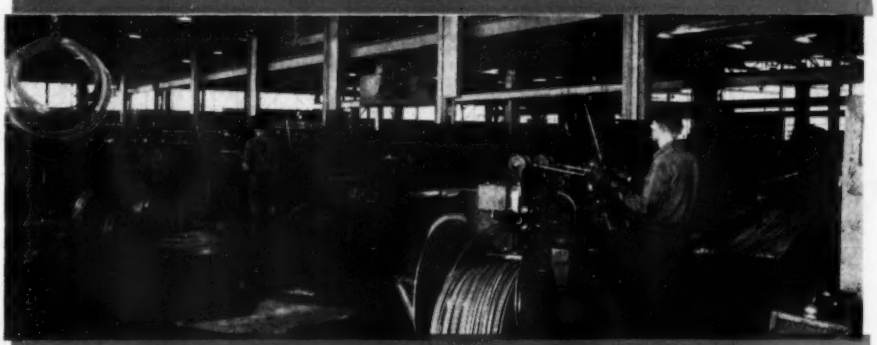
MAXIMUM MACHINABILITY

IMPROVED TOUGHNESS

MINIMUM WARPAGE

HIGHER STRENGTH VALUES





Wyckoff Heat Treated, Cold Finished Bars give steel fabricators a more dependable, easier working steel, having more uniform grain structure, greater strength and ductility. No heat treatment after machining is necessary thus saving costly heat treating, straightening and cleaning operation time.

Wyckoff metallurgists will be glad to work with you, now, on your post-war cost reducing planning.

ARMY E NAVY

COLD FINISHED STEEL WYCKOFF

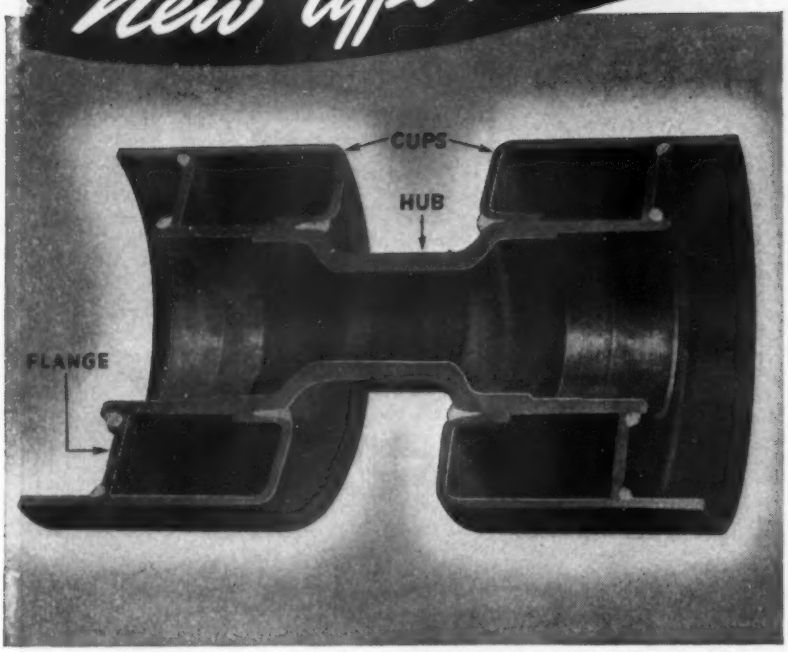
WYCKOFF STEEL COMPANY

General Offices: PITTSBURGH 30, PENNA.

Works: AMBRIDGE, PENNA.; CHICAGO, ILL.
NEWARK, N. J.; PUTNAM, CONN.

Manufacturers of Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2".
COMPLETE ANNEALING AND HEAT TREATING FACILITIES

New type roller designed with SEAMLESS STEEL TUBING



Cutaway section through top roller used on army half-tracks. Center-hub section is made from seamless steel tubing "spooled" to proper shape.

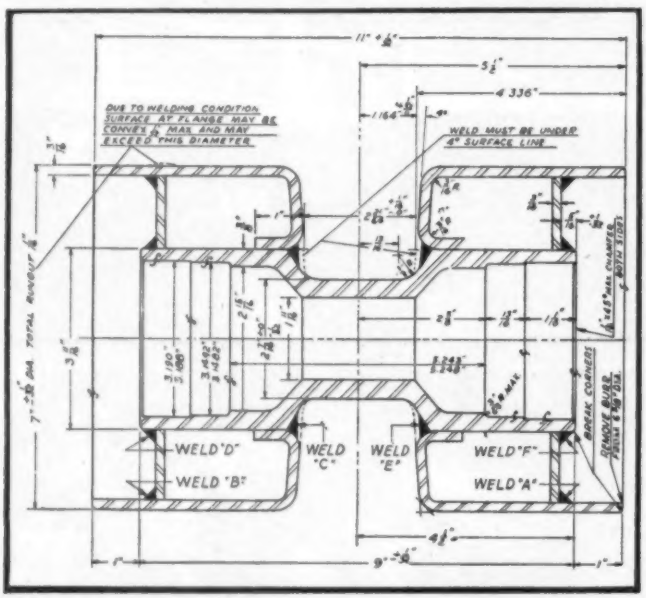

DUE TO WELDING CONDITION, SURFACE AT FLANGE MAY BE CONVEX & MAY AND MAY EXCEED THIS DIAMETER
WELD MUST BE UNDER 4" SURFACE LINE
WELD "D"
WELD "B"
WELD "C"
WELD "E"
WELD "F"
WELD "A"
BREAK CORNERS

Diagram of roller showing how flanges are fitted to tubular hub to make one piece unit.

Saves 38% in steel
Reduces rejects 100%
Cuts cost 39.1%

THIS "top" roller for half-tracks supports the continuous crawler tread as it returns along the upper portion of its travel. In former practice, out-of-balance rejects were running as high as 20% in regular production. Obviously something had to be done.

Careful study of the problem led to re-design of the unit. The new roller was made from Seamless Steel Tubing for the hub with rolled steel plates for cups and the closing end flanges (see diagram). These are assembled to form a one-piece unit by arc welding. Because all the processing operations involved lend themselves readily to handling on high production equipment, this roller is particularly suitable for manufacture by mass production methods.

38% Steel saved: Weight of the former design was 42 pounds with 14½ pounds machined away to give a finished weight of 27½ pounds. The weight of the new design before finishing is only 25½ pounds with *only* 1½ *pounds* machined away to obtain a finished weight of 24 pounds.

Rejects reduced 100%: Out-of-balance rejects formerly ran as high as 20% but not one unit has been rejected for this cause since it was re-designed.

Costs cut 39.1%: Costs have been reduced to $6.69 by the new method—a saving of $4.31 per unit.

This roller is just one of many war jobs that have been done better, faster, and at lower cost through the use of Seamless Steel Tubing.

When planning for peace products, plan to take advantage of cost-cutting methods made possible through SHELBY seamless steel tubing.

USS

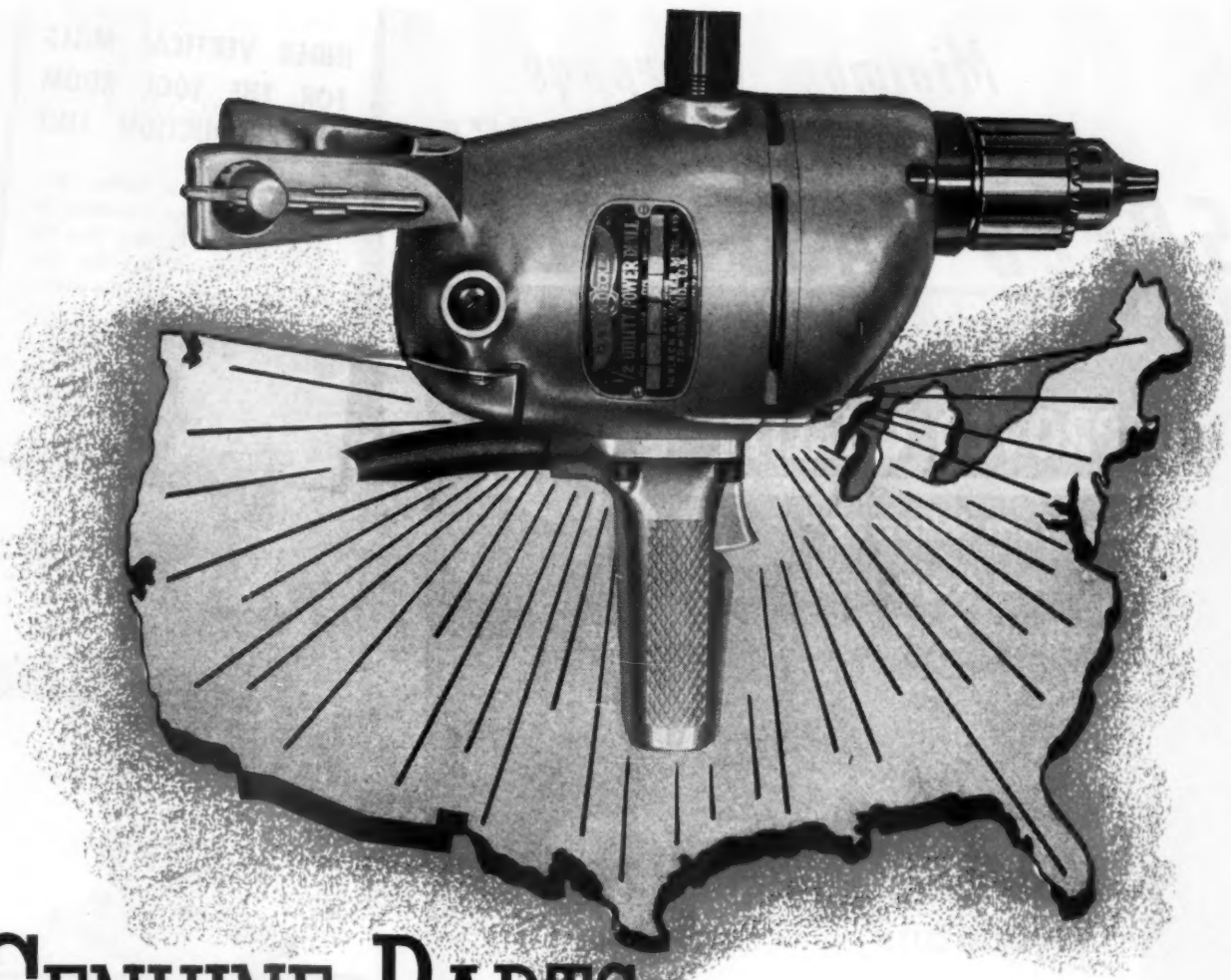
NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

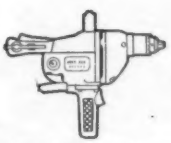
WALLS WITHOUT WELDS

UNITED STATES STEEL



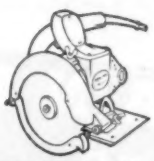
GENUINE PARTS

for Black & Decker Tools are never far away

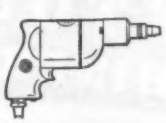


ELECTRIC DRILLS AND TAPPERS

PORTABLE SANDERS AND GRINDERS



ELECTRIC QUICK-SAWS AND SHEET METAL SHEARS



SCREW DRIVERS AND NUT RUNNERS

Factory Service Branches in 25 Cities* Help Keep Your Tools on the Job

Here's some of the extra satisfaction you get with every Black & Decker Electric Tool. If and when repairs are needed, expert service is quickly available . . . through company-owned Factory Service Branches in the 25 cities listed below.

These Branches carry genuine Black & Decker parts in stock . . . use no substitutes or makeshifts . . . and that's mighty important. For example: Genuine Black & Decker armatures, wound and dynamically balanced with our factory precision, can help you avoid burnouts that frequently result from hit-or-miss rewinding jobs.

This Factory Service, all over the map, is one of many reasons why Black & Decker Tools are a better buy . . . for all such jobs as drilling and tapping, screw driving and nut running, sanding and grinding, sawing wood and cutting sheet metal.

For help on any tooling problem, see your nearby Black & Decker Distributor. Get the extra satisfaction that comes with every product of Black & Decker—world's largest manufacturer of portable electric tools. The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland.

*FACTORY SERVICE BRANCHES: Atlanta, Ga.; Baltimore, Md.; Boston, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cleveland, Ohio; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Indianapolis, Ind.; Kansas City, Mo.; Los Angeles, Calif.; Memphis, Tenn.; Minneapolis, Minn.; Newark, N. J.; New Orleans, La.; New York, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; San Francisco, Calif.; Seattle, Wash.; St. Louis, Mo.; Towson, Md.; Toronto, Ont.; Montreal, Que.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

Minimum Warpage
Reduced Rejections 85%
SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT

IMPROVED QUALITY

- Minimum Warpage
- Reduced Rejections
- Excellent Carburizing Qualities
- No Soft Spots

Reduced Rejections

Customer reports part machined at 230 SFPM with resulting finish of 15 Macro inches. Speed Case was the only steel of 13 tried that produced parts with less than 22% rejections due to warpage during carburizing. Rejection on Speed Case runs less than 2%.

Customer increased production 27% and reduced costs more than 32%. Estimated savings per ton of Speed Case used, $37.41.

Write for SPEED CASE CATALOG. Actual shop records show savings of 20 to 65%.

OUR METALLURGISTS ARE AT YOUR SERVICE

If you wrote your own specifications for the ideal, all purpose, open hearth carburizing STEEL, it would be . . . SPEED CASE!

BUY WAR BONDS

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

INDEX VERTICAL MILLS FOR THE TOOL ROOM OR PRODUCTION LINE

Milling, Drilling or Boring. Verniers or Rods and Indicators for locating. Ask the shop that has one. Better still, ask the shop that has an Index and also another of competitive make.

Mfd. by Index Machine & Tool Co.

PROMPT DELIVERY!

12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

BLANK and BUXTON MACHINERY

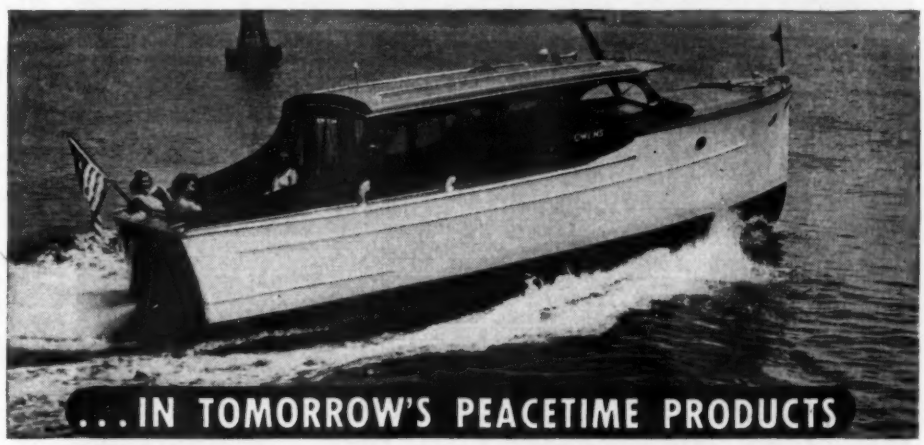
3100 E. MICHIGAN AVE. JACKSON, MICH.

AMERICAN Phillips SCREWS

for Top Speed and Lowest Cost of Assembly

...IN TODAY'S WAR EQUIPMENT

In the U.S. Army crash boats (shown above) and landing barges built by the Owens Yacht Company of Baltimore, American Phillips Screws are used to make *speedier, stronger fastenings* . . . to get these vitally needed craft into service quicker, and to make sure they will stand up to the strenuous service required. Owens workers, using power drivers, make clean and flush fastenings right down the line, with American Phillips Screws. No fumbling starts, no crooked driving, no gouged work-surfaces, no split screw-heads. This is typical American Phillips Screw performance.



...IN TOMORROW'S PEACETIME PRODUCTS

Owens Yacht Company's peacetime pleasure craft, like their present-day war craft, will feature sturdy, ship-shape fastenings made by power-driven American Phillips Screws. In fact, the matchless speed and controlled accuracy of American Phillips fastenings will help this well-known boat builder to meet the pent-up, urgent demand for his quality product . . . and still maintain his rock-bottom cost per fastening. In fact, in all fields of peacetime production, the production advantages of American Phillips Screwdriving will continue to be just as important as they were in meeting wartime delivery schedules . . . on time and with the inspector's OK.

4-WINGED DRIVER CAN'T TWIST OUT OF ENGINEERED TAPERED RECESS IN AMERICAN PHILLIPS SCREW HEAD

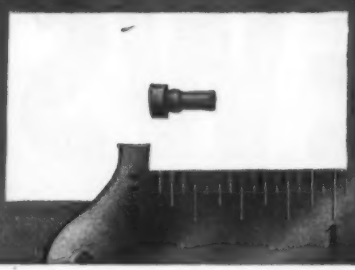
AMERICAN SCREW COMPANY

PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street *Detroit 2:* 502 Stephenson Building

Put the Screws on the enemy...BUY BONDS!

PRODUCTION DATA—"R" MONEL



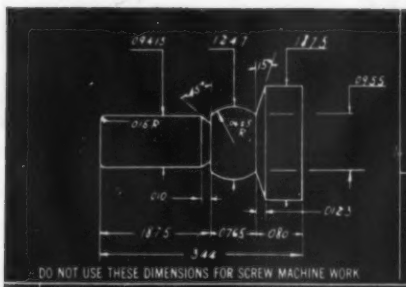
Courtesy of

FEURER BROS.

228 East 45th Street, New York 17, N. Y.

Watch Crown Manufacturers and Precision Instrument Parts

PRECISION PIN
machined at high speed
from machining quality "R" Monel



MAX. RADIUS ..... IN.
MEAN ..... IN.
MIN ..... IN.

CAM RATIOS
HEAD STOCK 1:2
ROCKER 1:3
NO. 3 1:2
NO. 4 1:6
NO. 5 1:
ATTACHMENT 1:
SPINDLE SPEED 1800 R.P.M.
THREADING SPEED R.P.M.
SURFACE SPEED 33 R.P.M.

(VARIABLE BY CHANGING SPINDLE AND CAM SHAFT SPEEDS)

NO	OPERATIONS	Travel of Tool	Ratio to 1	Cam Change	Feed Unit = .001"	Revolutions		Productive Degrees	Unproductive Degrees	Time
1	RETURN #3									
	ADVANCE #1 To .094	.0965	3	.2895					8	8
	SP								2	10
2	TURNING .094 #1	.1875	2	.375	1.5	375	73			83
	SP								2	85
3	DECREASING #1 To .074 "FALL"	.010	3	.030	.75	40	8			93
	SP								2	95
4	RETURN #1 To .135	.0305	3	.0915					3	98
	SP								2	100
5	TURNING .135	.0765	2	.153	4.5	153	21			128
	SP								2	130
6	RETURN #1 To NEUTRAL	.076	3	.228					9	139
	ADVANCE #2 To .207	.040	3	.120						
	SP								2	141
7	FORMING BALL To .0955 #2	.05575	3	.16725	.6	280	56			197
	SP								2	199
8	RETURN #2 To NEUTRAL	.09575	3	.28725					8	207
	SP								2	209
9	ADVANCE #3	.130	2	.260					10	219
	#3									
	#4									
10	CUTTING OFF #3	.130	2	.260	.15	520	100			319
	CHAMFER #4	.020	2	.040	.6					
11	OPEN CHUCK								10	329
12	RETURN ARMS	.394	2	.788					4	333
13	CLOSE CHUCK								17	350
						1368	263	95		

MATERIAL: 3/16" "R" Monel.

MACHINE: Peterman Automatic Screw Machine.

TOOLS AND TOOL LIFE: Forming tool of Carboloy 883.
life . . . 15 to 20 hours.
Straight and turning tools . . . H. S. Rex, TMO.
life . . . 12 to 15 hours.

CUTTING LUBRICANT: Swan & Finch 525N Oil.

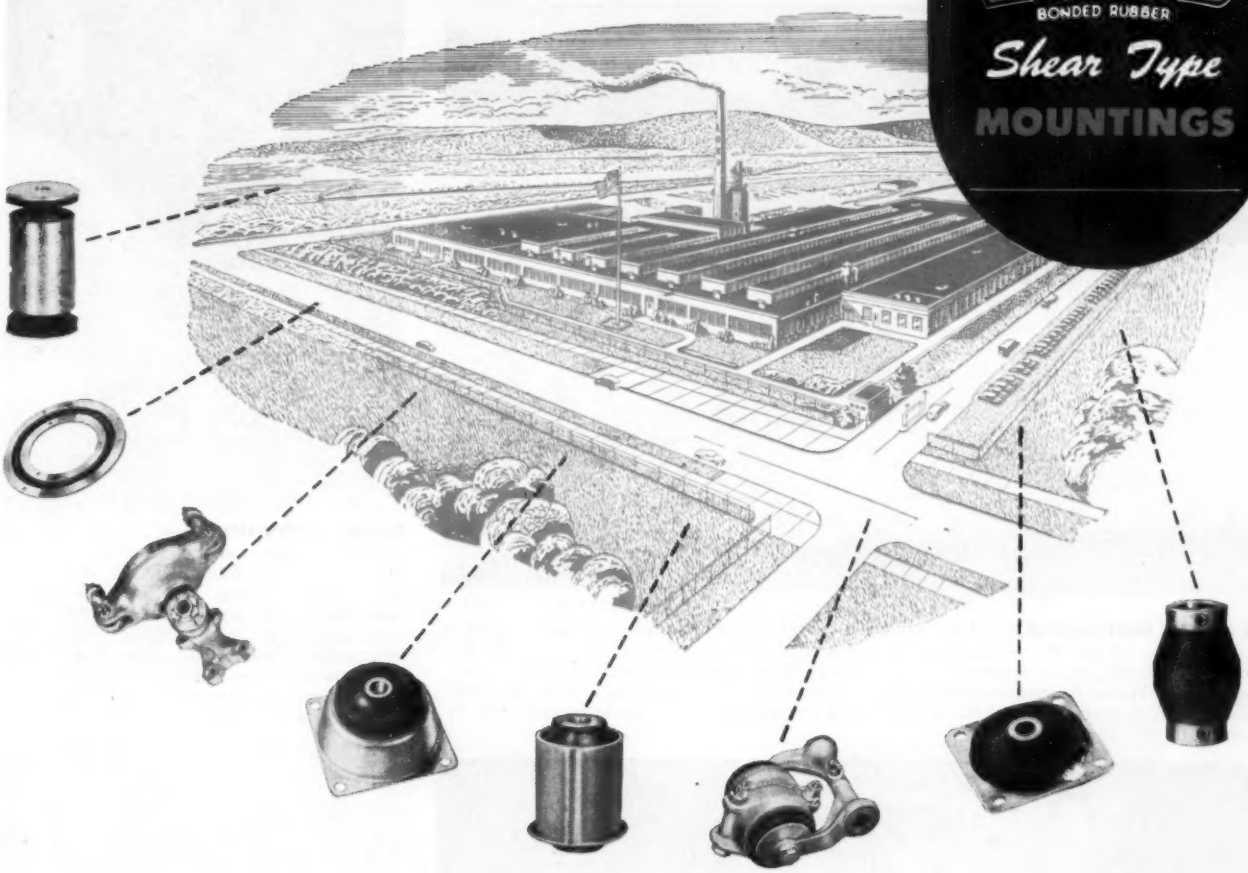
Write for INCO Technical Bulletin T-12, "Machining"...

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

The Plant Behind The Product . . .

LORD
BONDED RUBBER
Shear Type
MOUNTINGS



AN idea that was born over twenty years ago; an idea that was painstakingly developed on reams of paper covered with engineering formulas, drawings and mathematical computations; an idea that was proven in countless laboratory tests. That idea accounts for the fact that Lord has had to make three additions in as many years, to take care of the war-time demand for the best in vibration control mountings for airplanes, ships, tanks, and a hundred other tools of war.

The idea was that a Shear Type Mounting, properly designed, is vastly superior in vibration control to compression or tension type mountings. The work on paper and in the laboratory has continued; it has included designs for thousands of different jobs; it has included methods of bonding rubber to practically every industrial metal; it has included exhaustive tests of *natural rubber and synthetic rubber* of varying compositions and degrees of stiffness.

It has all resulted in Lord being the authority on vibration control and isolation. When a tough vibration problem comes up, the typical expression heard from the designer, the engineer, the shop superintendent is, "Send it to Lord".

Because Lord knows, there is a solution to your vibration problem. Perhaps it's in our free literature; perhaps you would do well to call in a Lord Vibration Engineer. No obligation attached to either service.

IT TAKES RUBBER *In Shear* TO ABSORB VIBRATION

LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA

SALES REPRESENTATIVES
NEW YORK - - 280 MADISON AVE.
CHICAGO - 520 N. MICHIGAN AVE.
DETROIT - - 7310 WOODWARD AVE.
BURBANK, CAL. - 245 E. OLIVE AVE.
CANADIAN REPRESENTATIVES
RAILWAY & POWER ENGINEERING CORP., LTD.
TORONTO, CANADA

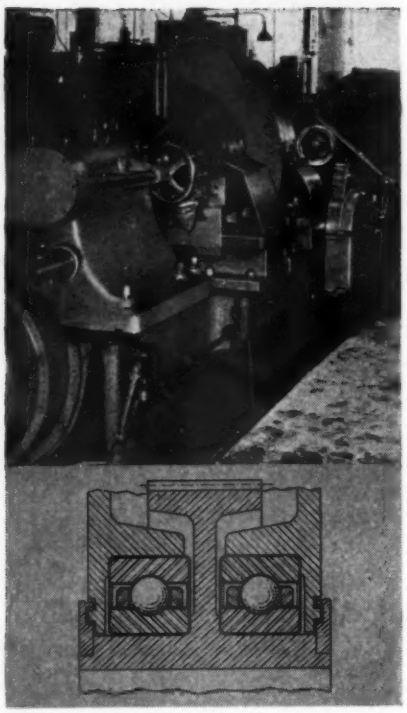
Originators of Shear Type Bonded Rubber Mountings

Do More Than Before—
Buy EXTRA War Bonds

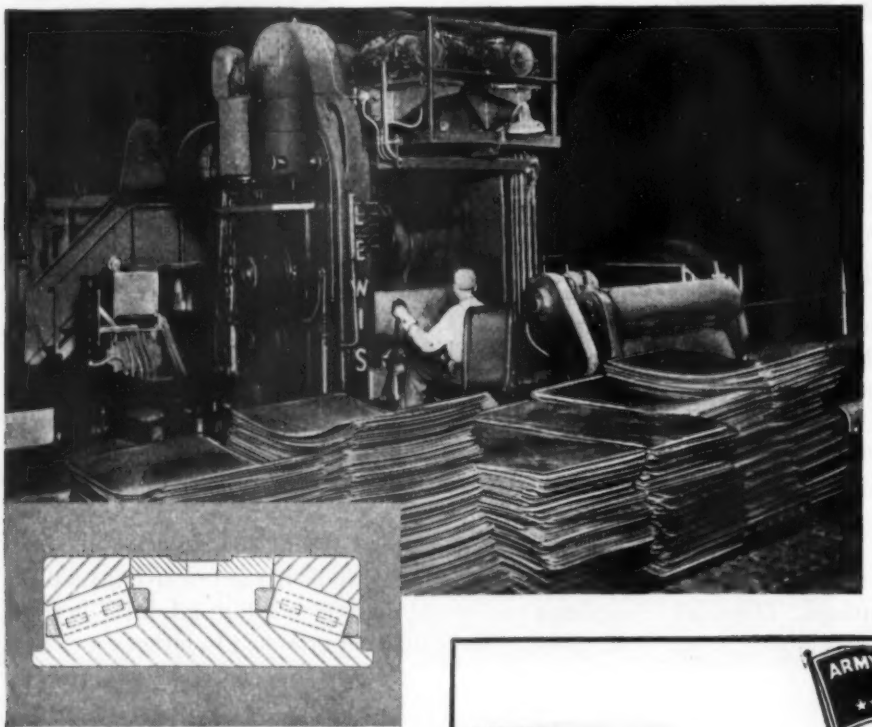
IN THE NEWS
WITH TORRINGTON BEARINGS

OFFICIAL PHOTO U. S. AIR FORCES

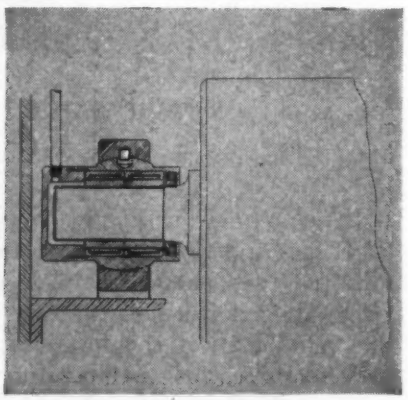
FLYING OVER 100 MILES AN HOUR this Army pilot of a Douglas B-23 tow plane is about to pick-up a 15-place glider. As the tow plane comes in, the arm of a pick-up device, manufactured by All American Aircraft, Inc., is lowered to catch the suspended tow line shown in the foreground. Torrington Ball Thrust Bearings were specified for installation in the mechanism of the pick-up, because of their capacity to withstand the severe and sudden shock loads encountered in the operation.



TURNING CRANKSHAFTS to precision limits is the important operation performed by this machine tool manufactured by the Hall Scott Motor Car Company. Due to high loads encountered in the center drive assembly, engineers specified the installation of two Torrington Ball Radial Bearings, as shown in the accompanying cross-section. The bearings have an outside diameter of 34″; an inside diameter of 27″, and are 3½″ wide.



THIS THREE-HI ROUGHING BREAKDOWN SHEET MILL, built by Lewis Foundry & Machine, is equipped with two-row tapered roller bearings, supplied by Torrington's Bantam Bearings Division, as shown in the accompanying cross-section. With each row employing 34 rollers, 1⅞″ long and 1-3/32″ in diameter, these bearings have a radial load capacity of 216,200 pounds; a thrust load capacity of 148,900 pounds at 100 R.P.M.



SUBMERGED in a bonderizing solution, the specially designed NCS Needle Bearings, shown in the accompanying cross-section, are sealed in a leak-tight housing equipped with a compressed air line to prevent the solution from reaching the bearing during operation. This is another example of Torrington's ability to adapt Needle Bearings to unusual applications. If you need counsel on standard or custom-built bearings, TURN TO TORRINGTON.

ARMY E NAVY

TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

From billet to bolt

—CIRCLE Ⓑ

● The quality, accuracy and dependability of all circle Ⓑ fasteners are rigidly controlled in one integrated plant —the largest independent in the country—from billet to the finished product.

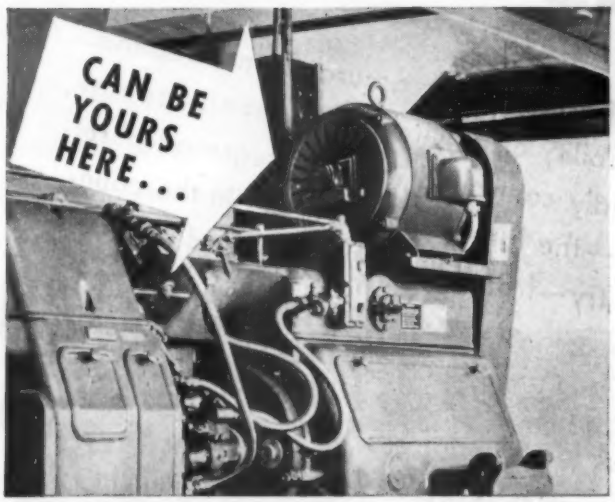
BUFFALO BOLT COMPANY

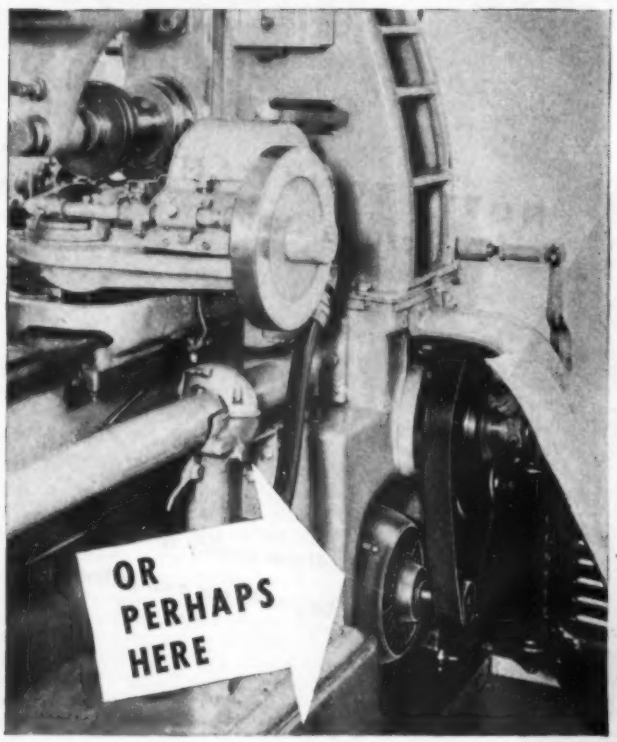
ARMY E NAVY

NORTH TONAWANDA, N. Y.

SALES OFFICES IN PRINCIPAL CITIES

◀ The uniform quality of all circle Ⓑ products begins in our own rolling mills.





Uni-Shell MOTOR

HANDLES A TOUGH JOB FOR 6 YEARS!

For six years, an R & M Uni-Shell Motor and R & M Moyno Pump used by Macatee, Inc., Dallas, have been on the job producing ready-mixed mortar without a single breakdown.

First, lump lime is slaked. And, while at a temperature of 215° F., this milk of lime is drawn through the pump from 60 feet away and lifted 30 feet into storage tanks.

After about three weeks the stored lime from which the water has been drawn is in a heavy plastic or putty state. The *same* motor and pump then draw the lime putty from the storage tanks and lift it to a loading hopper 20 feet above the pump. One Uni-Shell Motor running forward and reverse handles *both* operations.

And such performance isn't limited in application. You can have it on lathes, milling machines; in fact, on motor-driven equipment of any kind.

When considering motor power for all types of equipment, it is well to remember that the Uni-Shell line is the only complete motor line in which all types in any one frame size are *interchangeable* and similar in appearance.

For example, with equipment ordinarily built for polyphase induction motors, the occasional need for single-phase or direct-current motors requires only a simple replacement.

Get all the facts on the ways in which Uni-Shell long life and easy interchangeability can help solve your motor problems. Ask for the helpful, 20-page Uni-Shell Motor booklet, today.

ARMY NAVY

SHIPMENT NOW!

Ample stock on most types of integral motors on hand as this goes to press. Wire or phone your inquiry.

ROBBINS & MYERS • INC.

MOTOR DIVISION, SPRINGFIELD, OHIO

HOISTS & CRANES • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878

WON'T WORK LOOSE!

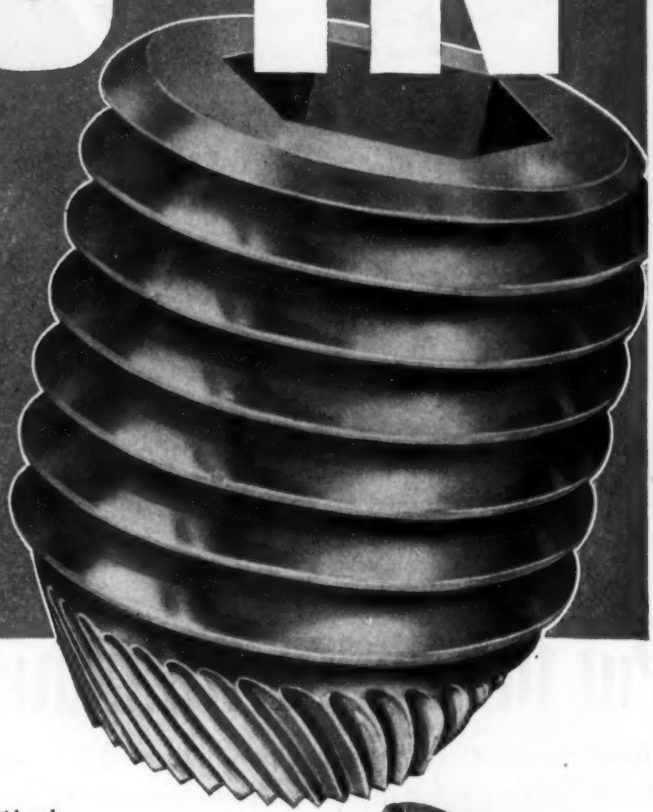
DIGS IN

Reg. U. S. Pat. Off.

UNBRAKO

SELF-LOCKING HOLLOW SET SCREWS with the knurled points

When designing machines or other equipment requiring set screws take the simple precaution of specifying "Unbrako" Self-Lockers because when they are tightened as usual, the knurled points dig in and hold the screws tight in spite of vibration or jarring. They're easily removed, though, with a wrench and can be used again and again. Sizes from No. 4 to 1½" diameter.



Pat'd and Pat's Pending

Our "Unbrako" Catalog is full of information about "Unbrako" Screw Products . . . mighty handy for designers and engineers. Send for a free copy today.

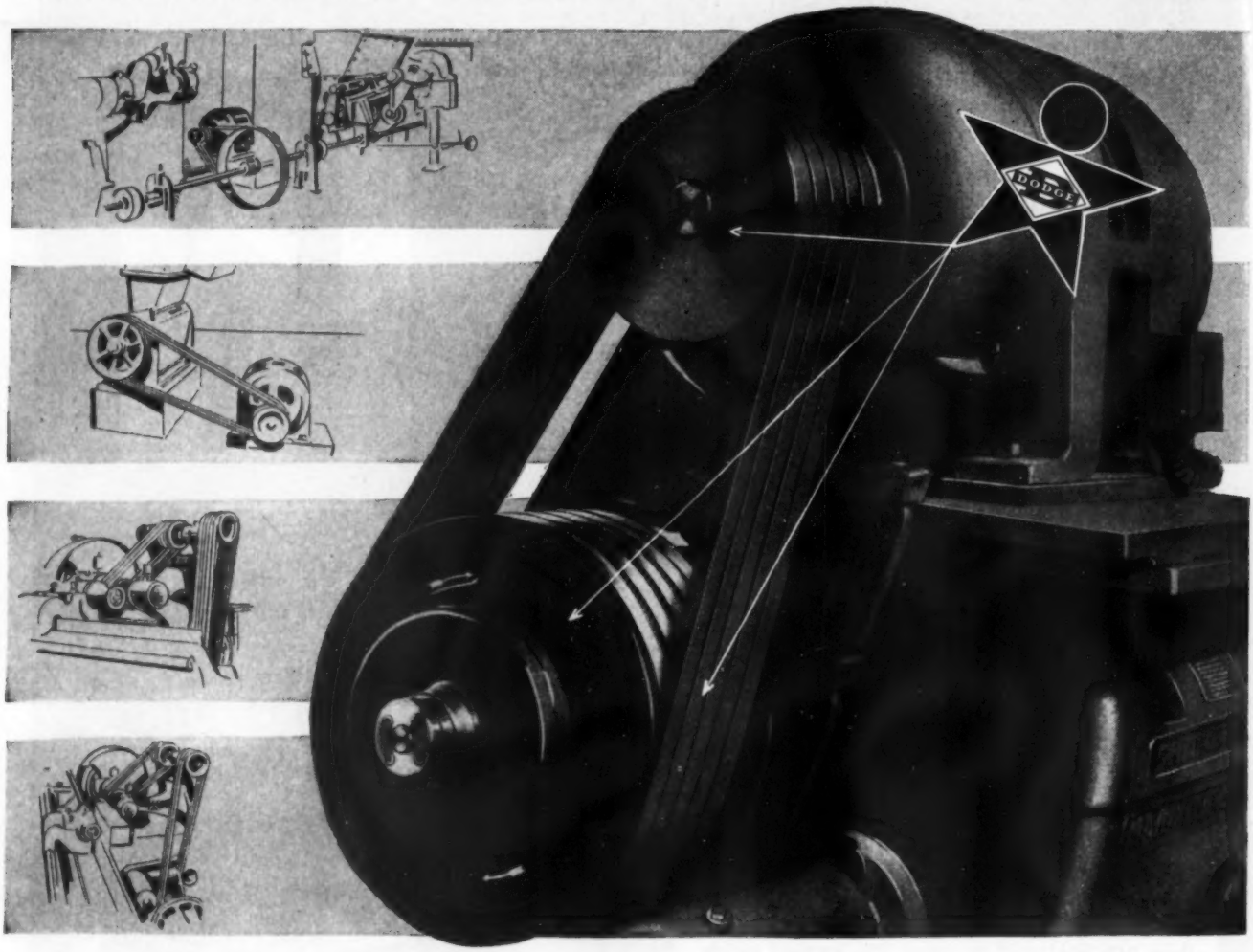
KNURLED SOCKET HEAD CAP SCREWS

Speed the job! Because the knurled head prevents the fingers, handiest of wrenches, from slipping and wasting time. Knurling also permits locking after countersinking, yet screw can be removed with a wrench and used again and again. Sizes: No. 4 to 1½" diameter.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

TRANSMISSIONEERED MEANS ADVANCED DESIGN IN POWER DRIVES



Put the Dodge Transmissioneer on your Staff

When it's a matter of putting power to work — all of it—it's a job for the Dodge Transmissioneer. These specialists are graduates of a factory course in "transmissioneering" who know how to solve power drive problems effectively and economically.

Transmissioneered means advanced design in power drive equipment. Dodge Transmissioneers work with a complete line of standardized and precision-built bearings, sheaves, pulleys, clutches and other drive components which insures "The Right Drive for Every Job".

Whether your problem is one of stepping up war production or planning for reconversion, the Dodge Transmissioneer — your local Dodge distributor — can give you valuable counsel and, in many cases, supply your immediate needs from his local stock. Put him on your operating staff — his service is as close as your telephone.

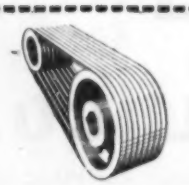
DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana, U. S. A.

BUY MORE WAR BONDS

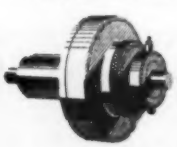
DODGE

The Sign of the Dodge Transmissioneer

Copyright 1944, Dodge Manufacturing Corporation No. 17



The Right Drive for every Job



The Modern Bearings

● The latest liquid-cooled and the latest air-cooled aircraft engines, the various U. S. Army trucks, two famous British artillery pieces—all have one thing in common. They contain more sleeve bearings than bearings of all other types combined.

The war has stimulated advances in sleeve bearing design and manufacture, making the sleeve bearing successful where other types have failed.

The Bunting organization has contributed its share to this advance. Bunting Cast Bronze Bearings are manufactured in stock or special dimensions, to standard or precision tolerances. Write for catalog.

Factory Finished Tubular and Solid Bars of Bearing Bronze are available for your own manufacture of special bearings. Ask your wholesaler... The Bunting Brass & Bronze Company, Toledo 9, Ohio... Warehouses in Principal Cities. 3

Bunting

BRONZE BUSHINGS ☆ BEARINGS ☆ PRECISION BRONZE BARS

USE HEADED AND THREADED FASTENERS FOR ECONOMY AND RELIABILITY

Alloy Steel BOLTS · NUTS STUDS

Every standard alloy steel fabricated into bolts, nuts, studs and many special fastenings. Accurately made in standard dimensions or to meet your specifications.

BETTER BOLTS SINCE 1882
A full line in carbon steel, heat-treated alloy steels, stainless steel, silicon bronze, brass, bronze, and monel metal.

PAWTUCKET

"THE BOLT MAN"

MANUFACTURING COMPANY

327 Pine Street • Pawtucket, R. I.

THE PLACE TO SOLVE YOUR BOLT PROBLEMS

Wm. Jessop Tool Steels

for BLANKING AND FORMING DIES — TAPS — REAMERS — PUNCHES—COLD CHISELS— CUTTING TOOLS — SHEAR BLADES—MILLING CUTTERS — DRILLS

use Wm. Jessop's EXTRA

BEST CAST STEEL

BECAUSE Wm. Jessop's Extra Best Cast Steel has proved its worth over a century and a half's continuous use and can be depended on for uniformity in quality, meeting every demand for dependability and uniformtiy. Available in bars, billets, discs, die blocks, rings, sheets and special sections.

Recommended Heat Treatment

ANNEALING: Heat to 1380° F. for 30 minutes to 12 hours, according to size and results required and allow to cool slowly.

FORGING: Heat to 1850° F. for the lower tempers and 1750° F. for the highest temper. Do not continue hammering below 1350° F.

HARDENING: Heat slowly to 1400 to 1450° F., according to temper; soak for approximate time and quench in water or brine. Temper all tools at 400° F. to 550° F. for at least 20 minutes immediately after quenching.

GRINDING: Use soft, free cutting wheel, If grinding is done dry, care must be exercised to prevent undue heating. Wet grinding with flood of water is preferable.

OTHER WM. JESSOP TOOL STEELS

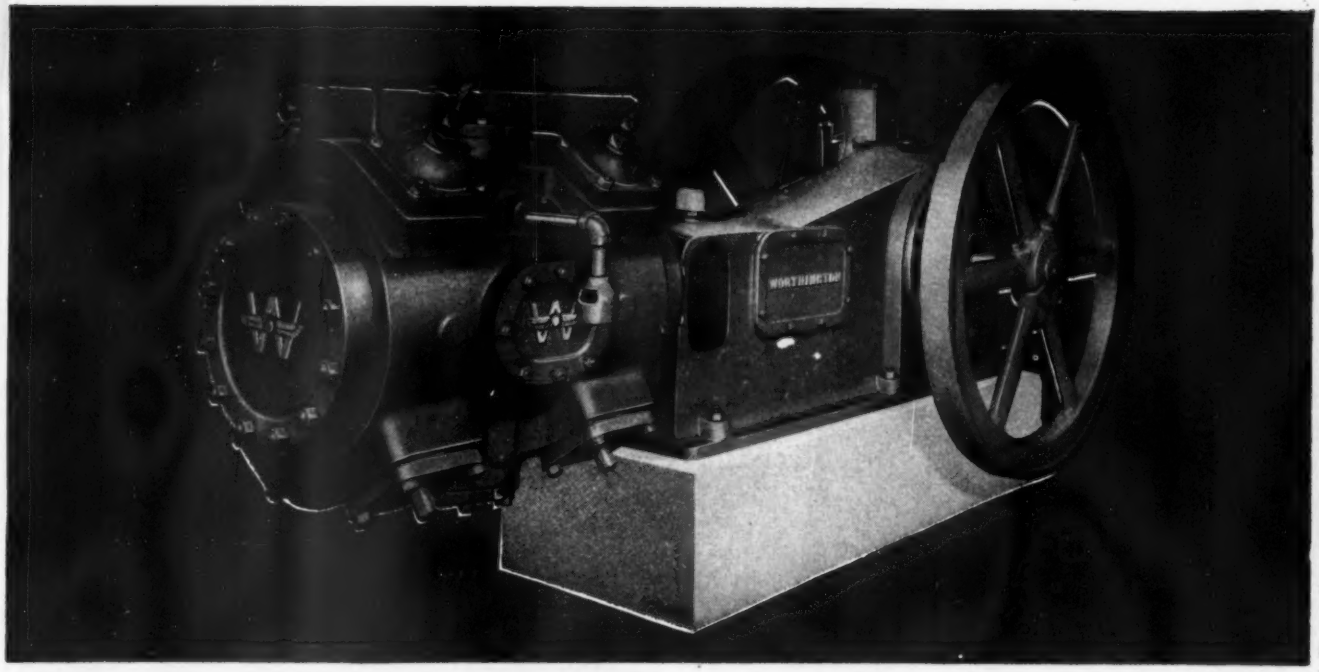
Superior Oil-Hardening Non-Deforming Tool Steel, High Carbon-High Chrome Alloy "C" Tool and Die Steel, J-4 Alloy Tool Steel, Special Carbon Cast Tool Steel, Ordinary Carbon Tool Steel, B B Hot Die Steel, Wm. Jessop High Speed Steel.

Write for complete information. Ask for Wm. Jessop advice and assistance.

Wm. Jessop Quality Tool Steels set new production records
Current stock lists always available

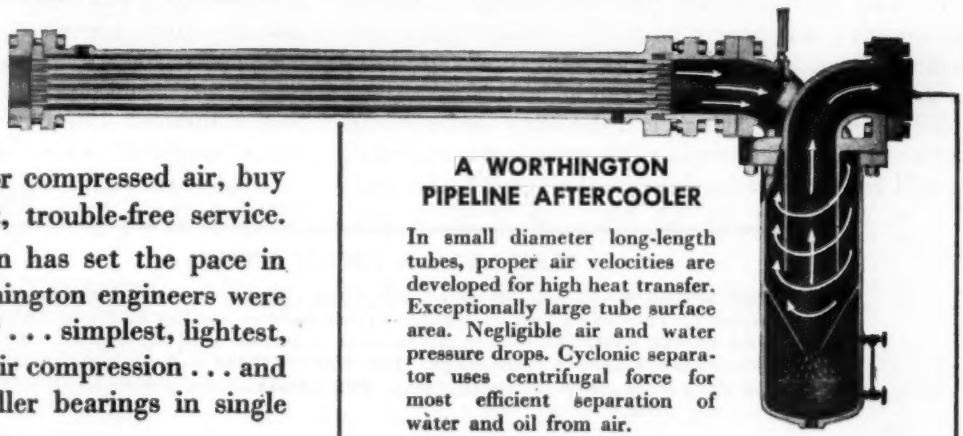
Wm. Jessop & Sons, Inc.

627 SIXTH AVE. NEW YORK, N. Y.
Branch Warehouses: Chicago, Boston and Detroit



Compressor BY WORTHINGTON

For Dependable Air at Lowest Cost



A WORTHINGTON PIPELINE AFTERCOOLER

In small diameter long-length tubes, proper air velocities are developed for high heat transfer. Exceptionally large tube surface area. Negligible air and water pressure drops. Cyclonic separator uses centrifugal force for most efficient separation of water and oil from air.

No other compressor will outperform a Worthington

Whatever your need for compressed air, buy Worthington for efficient, trouble-free service.

For years, Worthington has set the pace in compressor design. Worthington engineers were *first* with Feather Valves* . . . simplest, lightest, most effective valves for air compression . . . and *first* with anti-friction roller bearings in single horizontal compressors.

In many cases, in all kinds of manufacturing plants from coast to coast, the type "HB" Worthington Air Compressor shown above has been in operation, without major adjustments, for more than a quarter of a century.

Write for complete data—installation photos—in Bulletin L-640-B1. AC 4-6

* Reg. U. S. Pat. Off.

WORTH BEHIND THE NAME WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION, HARRISON, N. J., U. S. A.

Because they compress abundant fastening strength into much less fastening space, P-K Socket Screws contribute to a more compact design, and allow substantial metal savings, wherever they can be used.

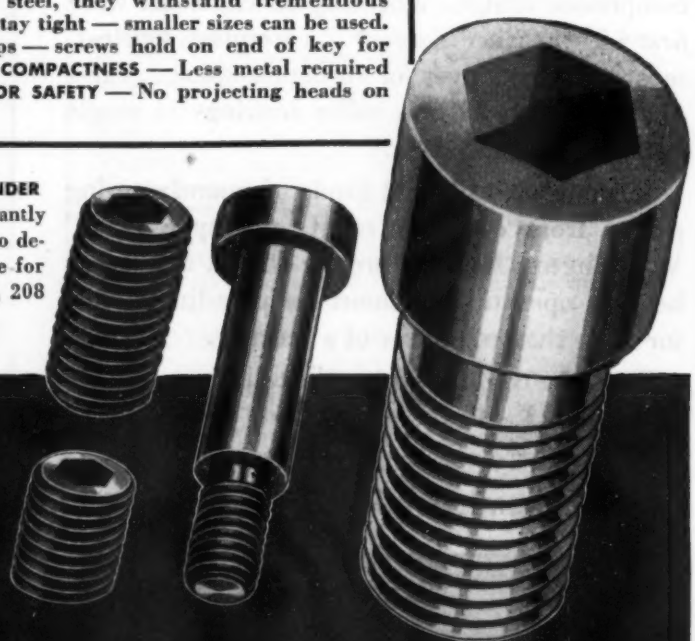
Look into these savings, and the other design advantages of P-K Socket Screws, while your post-war product is still on the drafting board. Have a P-K Assembly Engineer help you find the spots where they will save assembly time, lower costs, and improve construction.

By specifying Parker-Kalon Socket Screws, you make certain of assemblies that can be trusted for strength and endurance. Unique P-K "Quality-Control" eliminates "doubtful" screws – screws that *look* right, but some of which might fail to *work* right.

PLAN with P-K SOCKET SCREWS —

FOR STRENGTH — Cold-forged of alloy steel, they withstand tremendous stresses. They can be set up tighter — stay tight — smaller sizes can be used. **FOR FASTER ASSEMBLY** — Key never slips — screws hold on end of key for placement in hard to reach spots. **FOR COMPACTNESS** — Less metal required in flanges or other fastening areas. **FOR SAFETY** — No projecting heads on moving parts.

FREE SOCKET SCREW DIMENSION FINDER Gives you the information you need instantly – saves leafing through tables. FREE to designers, engineers, draftsmen . . . write for yours. Parker-Kalon Corporation, 208 Varick Street, New York 14, N. Y.

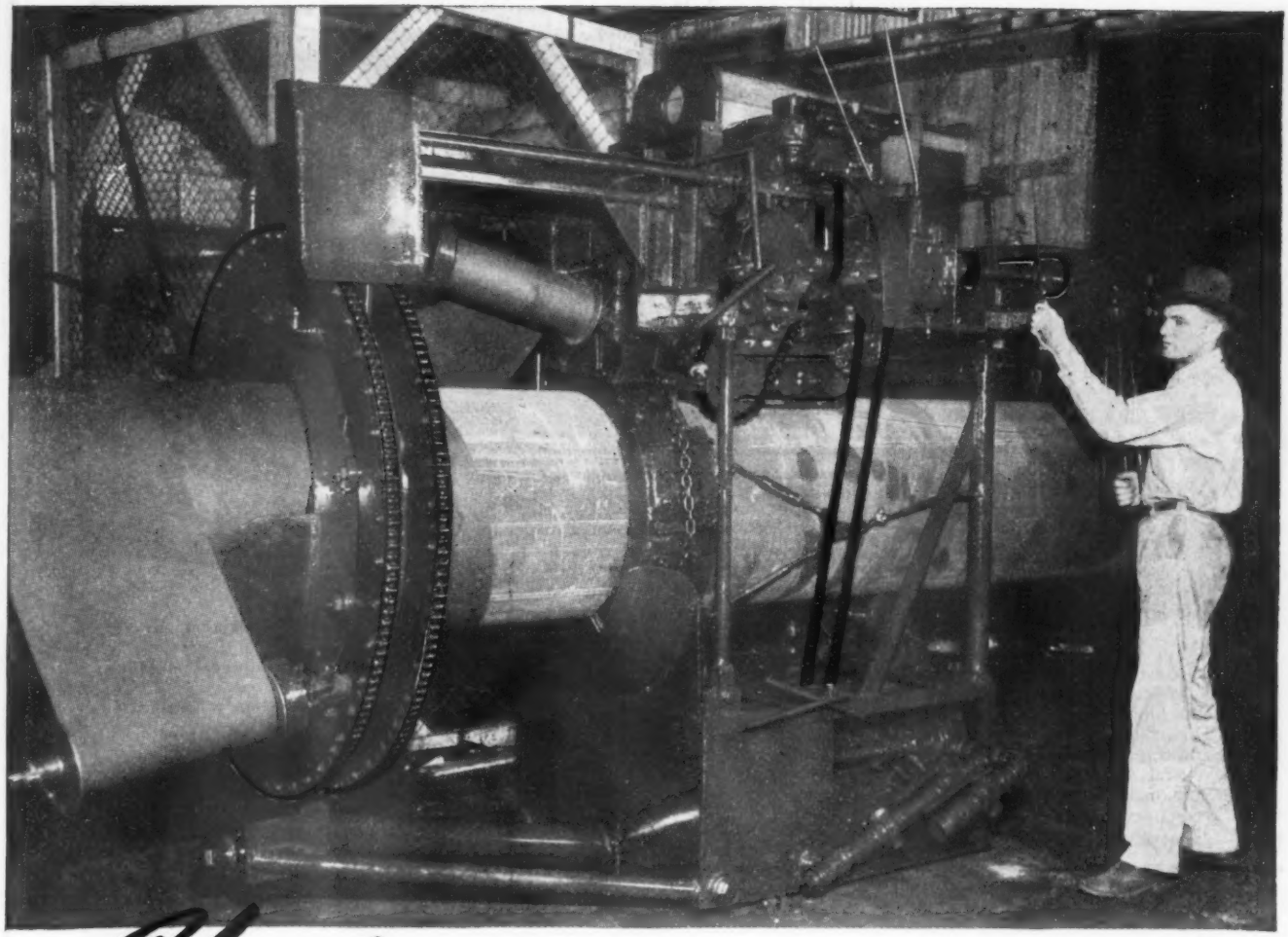


PARKER-KALON

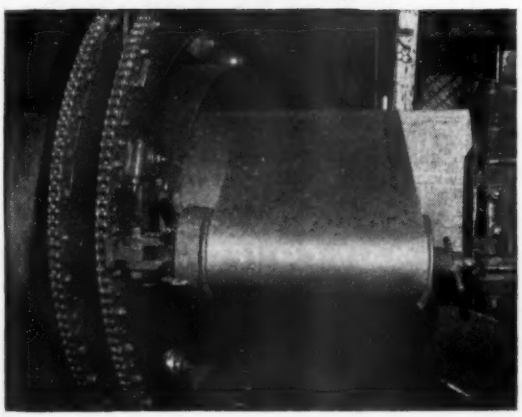
Quality-Controlled

SOCKET SCREWS

A Product of **PARKER-KALON**--*Specialists in Fastening Devices*



Chain EASILY MEETS UNUSUAL DRIVE REQUIREMENTS



America's horsepower flows through these pipes from the oil fields to every key point in the country. Without suitable protection from the destructive elements in air, water and soil, every inch of thousands of miles of pipe would require frequent, individual inspection. But careful wrapping and coating helps prevent leakage, and minimizes pipe deterioration. Morse chain and sprockets on the pipe-wrapping machines means positive accurate control. Wrapping is applied evenly and under correct tension to insure maximum useful life of the coating, as well as the pipe it protects. Wherever power must be transmitted or controlled accurately and efficiently, Morse Chain has the answer. Consult your Morse engineer

Teeth—Not Tension

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE Roller and Silent CHAINS

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

Ampco bearing strips are used on Morton Draw-Cut Flash Trimming Machines.

Ampco Metal *Safeguards* vital parts against wear

Miscellaneous machine-tool parts made of Ampco Metal.

The wear-resistant and bearing characteristics of Ampco Metal justify its use by leading machine-tool builders at critical points. This superior aluminum bronze alloy has controlled physical properties that give it several times the life of ordinary bronzes and make it outstanding for service where close tolerances must be maintained. Insist on Ampco Metal in the specifications of machines you buy. And insist also that replacement parts for your older machines be made of durable Ampco. Write for "File 41 — Engineering Data Sheets."

Ampco Metal, Inc.
Department AM-12 Milwaukee 4, Wisconsin

AMPCO Reg. U.S. Pat. Off.
Metal
The Metal without an Equal

KNOW YOUR MATERIALS and how to work them

★

. . . send for these reprints of practical production data.

15¢ PER COPY

1. *Working of Aluminum Alloys*
2. *Working of Magnesium Alloys*
3. *Working of High Nickel Alloys*
4. *Working of Plastics*
5. *Working of Cast Copper-Base Alloys*
6. *Working with Quenching Fluids*

• Here, in compact, easy-to-use form, are digests of authoritative Metal-Working practice followed in war-busy plants. Each reprint appeared originally as one of the well-known *American Machinist* "blue sections." Each details characteristics of a particular material or group of materials . . . tells what they are and how to work them. Production executives find these compilations useful in employee training.

Check over the list above . . . if you want any reprints order them now while our limited supply lasts. Coupon below for your convenience.

MAIL COUPON TODAY!

American Machinist
330 W. 42 St., New York 18, N. Y.

Enclosed is $..... (stamps, money order or check) for the following "Working of Materials" reprints. (Price 15c each)

1 — 2 — 3 — 4 — 5 — 6

(Indicate by putting circle around number)

Name .....

Title .....

Company .....

Address .....

AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

"This is Where Nuts Shake Loose,"

*say over a thousand fleet operators in recent survey**

1. Universal Joints and drive shaft flanges	59.4%	7. Wheels	36.2%
2. Rear axle flanges	56.5	8. Backing Plate to Axles	23.0
3. Spring clips	54.3	9. Clutch and brake	13.7
4. Bumpers	49.5	and 52 other parts of the truck assembly, as well as 24 places in supplementary equipment.	
5. Body bolts	45.0		
6. Engine supports	39.0		

1,160 Fleet Supervisors put their finger on the LOOSE NUT MENACE!

Long life and high use are vital factors to fleet operators. To solve the loose nut menace, they call for an all-metal, one-piece nut—the nut that *can't shake loose.*

In the No. 1 danger spot named above, Boots Self-Locking Nuts held fast through 12 months testing of hard-driving wear and tear. With its built in steel lock, the all-metal Boots Nut grips tight. Can be used again and again. Unaffected by water, oil, chemicals.

BOOTS SELF-LOCKING NUTS
"There's No Excuse for a Nut Shaking Loose"

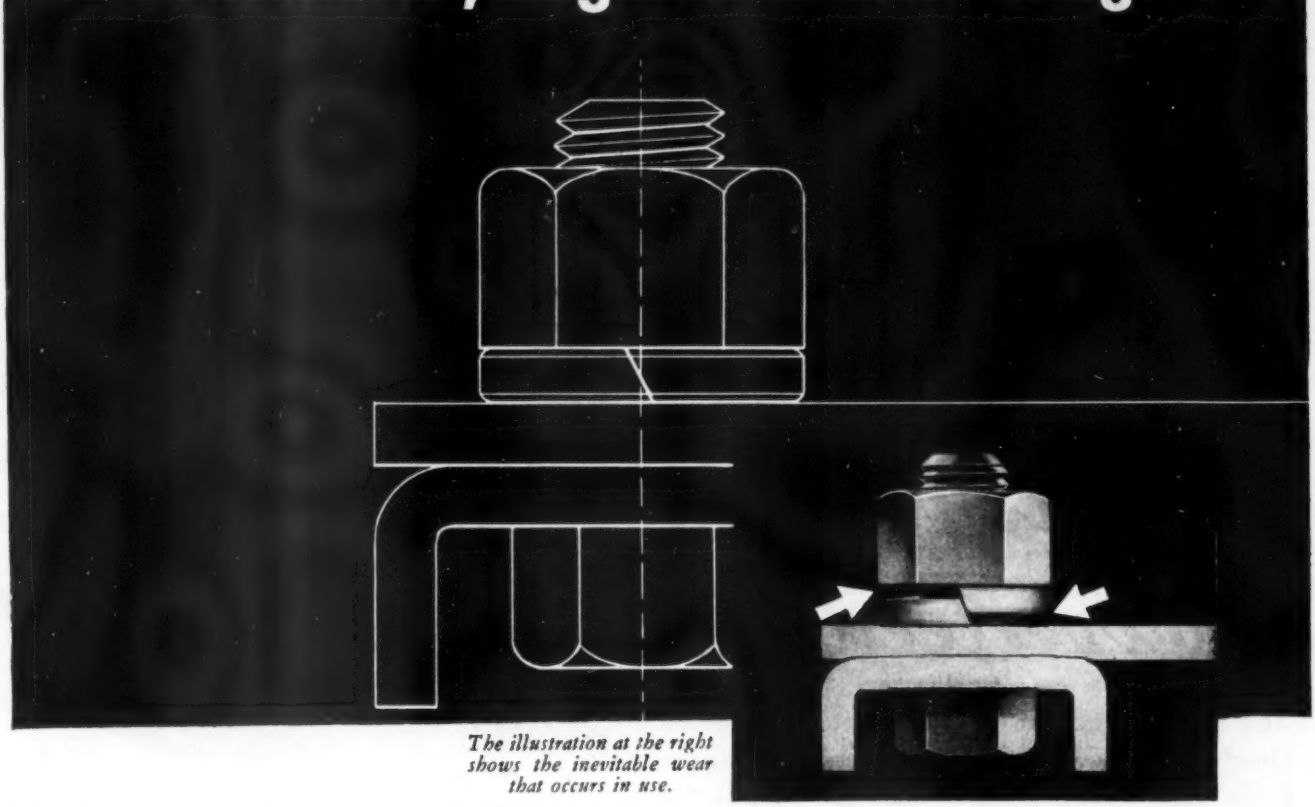
Boots Aircraft Nut Corp. • General Offices, New Canaan, Conn.

The ALL-METAL LOCK is Built-in Here

***OPERATORS OF 110,000 MOTOR VEHICLES** say that a vibration-proof nut like this would save tens of thousands of dollars in service costs.

Representatives in New York • Chicago • Detroit • Indianapolis • Los Angeles • Kansas City • Dallas • Toronto • Montreal • Vancouver

To Draftsmen, Engineers and Designers



The illustration at the right shows the inevitable wear that occurs in use.

In war time fundamentals are important, this is a fundamental

Many devices can lock a nut on a bolt so that the nut **cannot** turn. But that alone is not sufficient.

Many constructions – so bolted – will loosen because of bolt stretch, and the frictional wear of metal on metal, burrs, flares, and the pulverizing of paint, scale and rust.

Since the advent of the castellated nut, research has found that looseness is usually caused by ductility, and wear at every contact point of metal surfaces.

From an engineering point of view, nut **locking** devices – although they may keep the nut from turning – do not and cannot give the necessary spring reaction that keeps bolted assemblies tight. **Vibration** and **stress loosen everything** – they always have and always will.

You **must** use a spring which expands as wear occurs. Expanding **spring** power retards initial wear, then compensates for later wear, and **holds parts tight** for a **long period** of time. **A strong spring does it – nothing else can.**

So **with** or **without** a nut locking device specify spring washers on every bolted construction you design.

The **live spring** gives you safety, economy, and efficiency.

Kantlink spring washers are strong, nontangling, helical springs with wide and ample reactive power – (spring expansion).

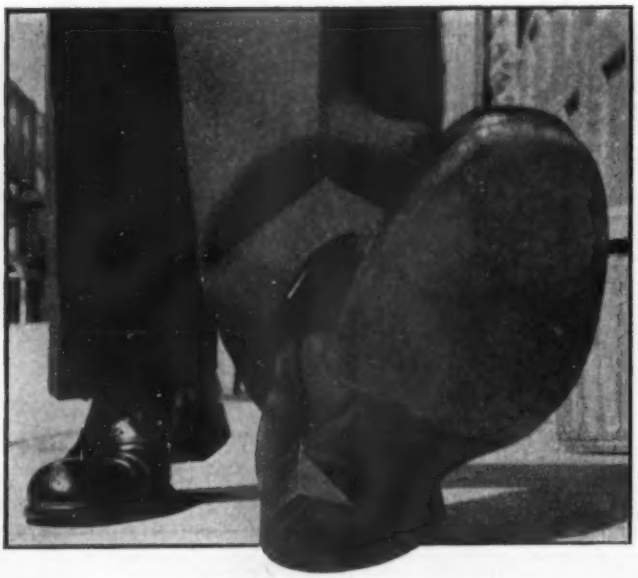
There is no substitute as economical. No fixed nut nor any short range multi-toothed washer can possibly equal the great holding power of a **long range live spring** – a big helical spring such as Kantlink.

Write today for a descriptive folder.

NATIONAL LOCK WASHER COMPANY
NEWARK, N. J., U. S. A.

KANTLINK
TRADE MARK

the long-range Spring Washer



In Step With Your Needs...

You need not go out of your way to buy Socket Head Cap Screws, Socket Set Screws, Stripper Bolts, Pipe Plugs, Square Head Dog Point Set Screws, Keys, or other Standard Screw Products manufactured by The Chicago Screw Company. These fine products are sold only thru authorized distributors—and there is one near you, ready to take care of your requirements.

You'll find our distributors carrying adequate stocks, and accustomed to giving prompt attention to all orders placed with them.

All "Chicago" Standard Screw Products are put up in sturdy packages, assuring adequate protection against damage while in stock or in transit. Cartons and boxes are clearly marked for quick, easy, sure identification.

You will be pleased with the superior quality of "Chicago" Standard Screws, and more than satisfied with the service of our distributors.

These Fine Products are sold only thru Authorized Distributors

THE CHICAGO SCREW CO.
ESTABLISHED 1872
1026 So. Homan Avenue Chicago 24, Ill.

Cams

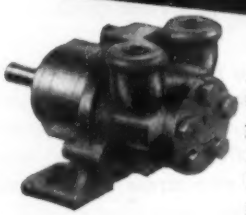
Let the largest, most completely equipped cam milling and grinding plant in the mid-west handle your cam problems. All sizes of drum, face, groove or other styles of cams cut to order in quantities of one or one thousand. Send specifications or blueprints for a quotation on your requirements.

KUX MACHINE COMPANY
3924-44 W. HARRISON ST., CHICAGO 24, ILL.

Visit our exhibit, A-311, at the NATIONAL METALS CONGRESS, Cleveland, Ohio, October 16th through October 20th

WEAPON FOR WORK

TUTHILL MODEL L PUMP Helps Win Battles on the Production Front



About the size of a hand grenade, this compact Tuthill small industrial pump is outstanding for hydraulic mechanisms, lubrication, fuel oil and liquid transfer service. Internal-gear rotary type, mechanically sealed. Capacities from .33 to 3 g.p.m. Pressures up to 400 p.s.i. Ring or foot mounted. Write for Model L bulletin.

SERVING ARMY NAVY • AIR FORCE MERCHANT MARINE

Tuthill ★

★ TUTHILL PUMP COMPANY ★
939 E. 95th STREET • CHICAGO 19, ILLINOIS

NO DRAG · NO ABRASION · NO HEATING

DISCS RIDE FREE IN NEUTRAL

DOUBLE CLUTCH TYPE

"MAXITORQ" Floating Disc Clutch . . . *manual assembly and adjustment* . . . NO TOOLS REQUIRED

Progressive development of the **"MAXITORQ"** Floating Disc Principle has reached a stage of perfection that insures simple, trouble-free operation with a minimum of maintenance.

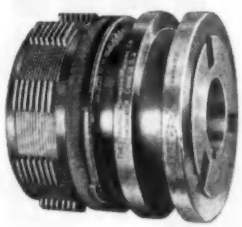
MANUAL ASSEMBLY: Without the use of tools, **"MAXITORQ"** clutches may be assembled, taken apart, or adjusted for disc wear with the greatest of ease. The simple turn of a knurled adjusting ring locks the discs to a proper setting.

In neutral no discs are in contact . . . you can see between them. Separator springs hold them free, unobstructed, to eliminate excessive drag and the consequent abrasion and heat.

Of paramount importance to trouble-free clutch operation is the quality of finish on the engaging faces of the discs. Carlyle Johnson has developed a special finishing process which assures perfectly flat, true surfaces and accurate duplication of all clutch thicknesses. This means that under engagement there will be no high or low spots . . . the entire area of the surfaces being engaged, with contact evenly distributed. Obviously the service life of the discs is greatly extended. In applications where most exacting accuracy is required, **"MAXITORQ"** is performing superbly.

Consider the **"MAXITORQ"** Floating Disc Clutch for intricate instruments, for machine tools, for rapid traverse operations . . . for all the usual clutch duties where smooth, silent, reliable service is most necessary.

SEND FOR NEW CATALOG No. 4.



SINGLE CLUTCH TYPE

Made in Dry or Wet types in both single and double clutches. Wet discs are hardened ground steel, run in lubricant. Dry discs are alternately steel and self-lubricating bronze. Pulley and Cut-Off Coupling types also available. Capacities ¼ to 5 H.P. at 100 R.P.M. Standard hub bores from ½" to 2¼" in all types.

THE CARLYLE JOHNSON MACHINE COMPANY
MANCHESTER, CONNECTICUT

MAXITORQ *floating* **DISC CLUTCH**

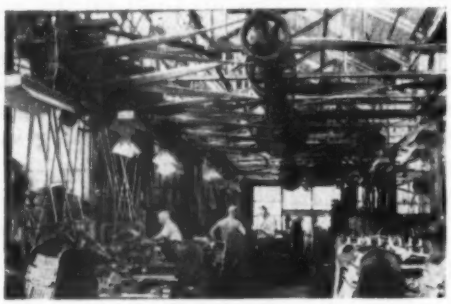
You can see between the discs

The way to More Efficient, Economical Belt Performance

Rhoads Engineering Service

Longer belt life is but one of the savings Rhoads Engineering Service—based on many years of leather belting manufacture and application—can offer. Economies also follow, through greater drive efficiency and the lower maintenance time and trouble needed. Be sure to get our help when planning a new drive or changing an old one.

Rhoads Tannate Leather Belting is a long life belt with unusual strength (1/3 to 1/2 higher than choice oak belting) and a firm pulley grip that maintains efficiency even under varying loads. It is resistant to moisture, machine oils and many weak chemicals. Little maintenance is required to assure long life.



Occasional applications of Rhoads Belt Preserver are recommended to keep belts in top condition far longer.

Rhoads Tannate WATERSHED LEATHER BELTING

J. E. RHOADS & SONS • Est. 1702
35 N. SIXTH ST., PHILA. 6, PA.
NEW YORK · CHICAGO · ATLANTA · CLEVELAND

STREAMLINED ACTION!

Gusher Pumps Patented and Patents Pending

MODEL 11020-A

The newer models in Gusher pumps, like that shown are perfectly adapted to the latest type machine-tools.

Streamline your machines with new-model.

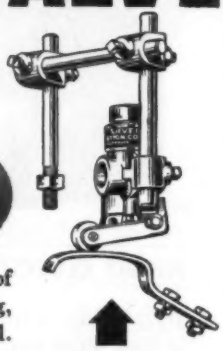
GUSHER COOLANT PUMPS

Notable for simplicity of design, minimum maintenance, range of flow (from a mere dribble to maximum capacity, with no leakage), adaptability to any type machine, capacity for hard usage, and moderate cost.

There is a Gusher model and type for your special needs. Write for new catalog, indexed for ready reference.

THE RUTHMAN MACHINERY CO.
READING ROAD CINCINNATI 2, OHIO
The "Gusher"—A Modern Pump for Modern Machine Tools

AIR-SAVER Leak Proof AIR VALVE



- Use wherever a controlled blast of air is needed for cleaning, drying, cooling or ejecting. Easy to install. Mount in any position. Operates at any angle. Provides extra large air volume. Clean seal, a long wearing valve designed to stay leak proof. Manufactured and guaranteed by Briggs and Stratton Corp., and marketed nationally by

Valve, mounting rods and operating cam, complete as shown.

$12.50 *f. o. b. Detroit*

Weight Four Pounds.

Palmer-Shile Co.
780 So. Harrington St., DETROIT 17, MICHIGAN

Trabon

TYPE M
POSITIVE CENTRALIZED LUBRICATION

costs so little—~~every~~ *no* machine owner can afford to ~~have it~~ *be without it*

● Here's the thing you've always wanted—positive—absolutely dependable lubrication—simple—easy to understand—easy to install—and unbelievably inexpensive. Now, you can avoid costly down-time while an oiler crawls around a machine lubricating each bearing manually, the breakdown if he misses one.

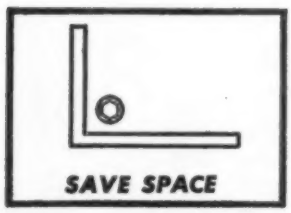
Make absolutely certain that every bearing on your machines whether large or small, moving or stationary, easy or difficult to reach receives just the desired amount of lubrication. Lubricate all the bearings on a moving machine member with just one flexible hose. Get full details—from our Bulletin No. 442. Send for a copy today.

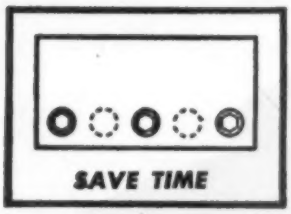
TRABON
ENGINEERING CORPORATION

1819 *East 40th Street • Cleveland 3, Ohio*

ORIGINATORS AND PATENT OWNERS OF THE SINGLE LINE REVERSING LUBRICATING SYSTEM

Yes, these screws save Time and Space!





No matter how close to a corner or flange you put Mac-it hexagon socket screws, there's plenty of room to drive them. This feature saves space.

★ ★ ★

Mac-its are heat-treated to give far greater strength than plain steel screws. With that extra holding power, you may be able to use fewer screws—save drilling and tapping time.

★ ★ ★

Production tie-ups because of broken screws are not necessary evils. Chances are that standard Mac-its will solve the problem.

Mac-its

PRONOUNCED "MACK-IT" 4311

OTHER MAC-IT PRODUCTS INCLUDE:

Socket head and hexagon head cap screws, stripper bolts, hollow and square head set screws, hexagon socket pipe plugs.

Strong, Carlisle and Hammond Company

Cleveland • Ohio

AISI HY-TEN **SAE**

NE

ALLOY STEELS FOR VICTORY

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

Wheelock, Lovejoy & Co., Inc.

138 Sidney Street
Cambridge 39, Mass.

Cleveland 14, Chicago 23, Newark 5, Detroit 3, Buffalo 10, Cincinnati 32

---

the BURDEN RESTS ON THEM!

ABBOTT'S 35th YEAR

Consider the tremendous contribution BEARING BALLS are making to war-time production—ABBOTT is proud to share in that responsibility. Today, as always, ABBOTT BEARING BALLS are "carrying the load as planned". For uninterrupted performance specify "ABBOTT".

THE ABBOTT BALL COMPANY, HARTFORD 10, CONN., U.S.A.

ROLL ON **ABBOTT** *Bearing* **BALLS**

"Continuous Balance" + PLUS Air-o-Line Control

MARKS A NEW ERA IN THE TREATMENT OF METALS

LOOK AHEAD
TO POSTWAR INSTRUMENTATION

see the ELECTRONIK in operation at the National Metal Exposition BOOTH F 601

"*CONTINUOUS BALANCE*" is a new principle in pyrometry. It makes the Brown *ElectroniK* Potentiometer an outstanding advance in instrumentation —probably the greatest step forward in several decades.

In this advanced potentiometer controller, the "*Continuous Balance*" unit takes the place of the galvanometer used in conventional mechanical-type potentiometers employing a periodic or cyclic mechanism.

The Brown *ElectroniK* Potentiometer Air-Operated Controller provides the ideal synchronization of measurement and control for temperature processes. What "*Continuous Balance*" does for measurement—"*Air-o-Line* Control" does for fuel modulation, being capable of infinite fineness in fuel valve adjustment. It is the only potentiometer-type controller in which the air-controlled flapper mechanism is continuously positioned in response to temperature changes.

Used with conventional wiring and thermocouple installations, Brown *ElectroniK* Potentiometers are rapidly outmoding all other forms of temperature controllers in heat-treating processes.

Thousands of operating hours have proved the Brown *ElectroniK* Potentiometer's superior performance—sensitivity—and ruggedness. Its electronic "*Continuous Balance*" principle makes it possible to take full advantage of thermocouple responsiveness, which means precise control with uniformity hitherto impossible.

Write for Catalog 15-4, THE BROWN INSTRUMENT COMPANY, *a division of Minneapolis-Honeywell Regulator Company*, 4501 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities. 119 Peter Street, Toronto, Canada—Wadsworth Road, Perivale, Middlesex, England—Nybrokajen 7, Stockholm, Sweden.

Balance Must Be Continuous

BROWN *ElectroniK*
POTENTIOMETERS

ARTERIES *with* INTESTINAL FORTITUDE

NORGREN HYDRAULIC HOSE ASSEMBLIES

. . . form arteries for your machines strong, tough, and flexible enough for any service. They are heat . . . cold . . . solvent . . . and vibration resistant.

Offered in a full line covering all requirements for high or low pressures, hydraulic and pneumatic. Send specifications with your inquiry, including I. D. and overall length and thread requirements. C. A. Norgren Company, 220 Santa Fe Drive, Denver 9, Colorado.

Norgren

HOW TO WELD

—basic principles

—step-by-step procedures

—special techniques

Eliminate hours of needless trial-and-error learning by using the methods of experienced welders presented in this new book. Here, in simple everyday language, are the basic step-by-step procedures for making any kind of weld. Let this book help you save time and avoid errors by showing you how to use correct technique from the very beginning.

Just Published!

Arc and Acetylene Welding

By HARRY KERWIN

Formerly of California Polytechnic School, San Luis Obispo, California

240 pages, 201 illustrations, $2.50

This practical manual covers the whole field of welding to give you a thorough working knowledge of up-to-date methods used in shipyard, aircraft, pipe line, and general maintenance work. It gives you workable methods for controlling expansion and contraction of metals, shows you how to test weld samples, thoroughly explains difficult techniques for arc welding of cast iron, low heat brazing, etc. This is a book to provide the beginner with a complete training in practical welding processes—aid the advanced welder who wishes to add special fields to his knowledge.

Practical—Tested

● Used in the author's welding classes, this method has been found to shorten training time in most cases by as much as fifty percent.

GIVES YOU PRACTICAL TECHNIQUES FOR:

—making an edge weld
—making a weld in the vertical position
—making a tube cluster weld
—welding stainless steel
—making a single-pass weaving-bead vertical fillet
—cutting with the arc
—making a rolling pipe butt weld
—making a T, or saddle, weld
—making an angle weld
—striking the arc and running a bead in the flat position
—constructing a pattern layout
—making a penetration bead on a flat plate
—making a flat fillet weld in three passes
—making a vertical butt weld with weaving beads, with stringer beads, and with a backup strip

CHAPTERS

ACETYLENE WELDING

The Weld. Welding Equipment. Preparation for Welding. Basic Practice Plates. Aircraft Welding. Final Test Plates of Army and Navy A Test. Pipe Welding. Forehand and Lindeweld Technique. Identification of Metals. Expansion and Contraction. Cast-iron Welding and Cutting. Hard Facing and Alloy Welding. Brazing. Tables. Safety Rules.

ARC WELDING

The Welding Machine and Its Care. The Electrode. Wearing Apparel. The Welding Booth and Welding Bench. Beading Technique. Expansion and Contraction. Cast-iron Welding. Aluminum Welding. Building Up and Hard Facing. Testing Weld Samples.

ASK TO SEE IT 10 DAYS FREE

McGRAW-HILL EXAMINATION COUPON

McGRAW-HILL BOOK CO., 330 W. 42 St., N. Y. C. 18

Send me Kerwin's ARC AND ACETYLENE WELDING for 10 days' examination on approval. In 10 days I will send $2.50 plus few cents postage or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

City and State .....

Position .....

Company ..... A. 10-12-44

(Books sent on approval in U. S. and Canada only.)

You'll find it much cheaper

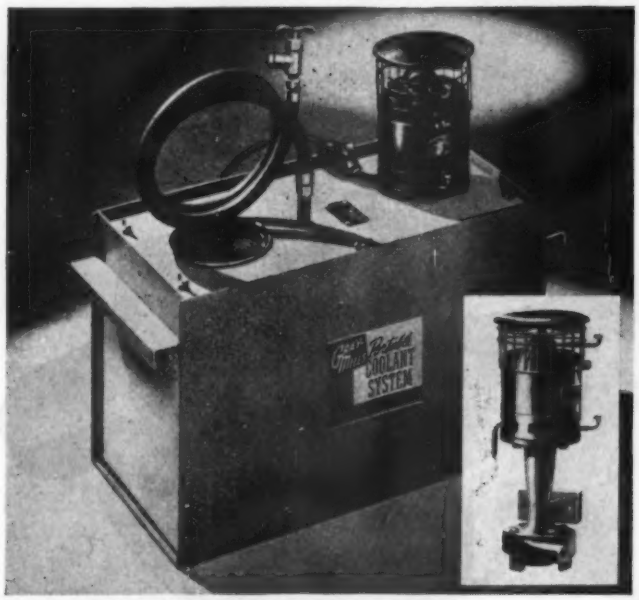
to give your men these

Instead of these

Protect your production... with AO Safety Goggles

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

GRAY-MILLS *Portable* PUMPING UNITS



For Pumping:

Coolants and Cutting Oils • Lubricants
Solvents • Hydraulic Oils • Chemicals
Quenching Fluids • Inks and Paints
Other Fluids and Solutions

NEW Model 1130 Centrifugal PUMPING UNIT for applying coolants to grinders, cut-off machines and other tools, or for supplying lubricants, solvents, etc. Heart of the unit is Model 1100 Gray-Mills Centrifugal Pump (inset), capacity 360 GPH at 5' head; motor is 1/15 H. P. Pump is available as independent unit.

In hundreds of industrial applications Gray-Mills Pumping Units are supplying fluids, such as those listed above, for a variety of uses. These compact, self-contained systems apply a fluid at the point of use, either in constant flow or intermittently. They may be used for recirculating fluids, as in a coolant system—or to pump liquid from one point to another.

Gray-Mills Pumping Units are available in standard models, gear and centrifugal types, with capacities from 60 to 2200* gallons per hour, 12 to 50 lbs. PSI pressures.

Think over your fluid handling problems—perhaps you'll find a Gray-Mills unit is a simple, ideal low cost answer—and if you have a special problem, there is a Gray-Mills engineer ready to help you work it out. See your Mill Supply Distributor or write for catalog and full details.

*5 foot head.

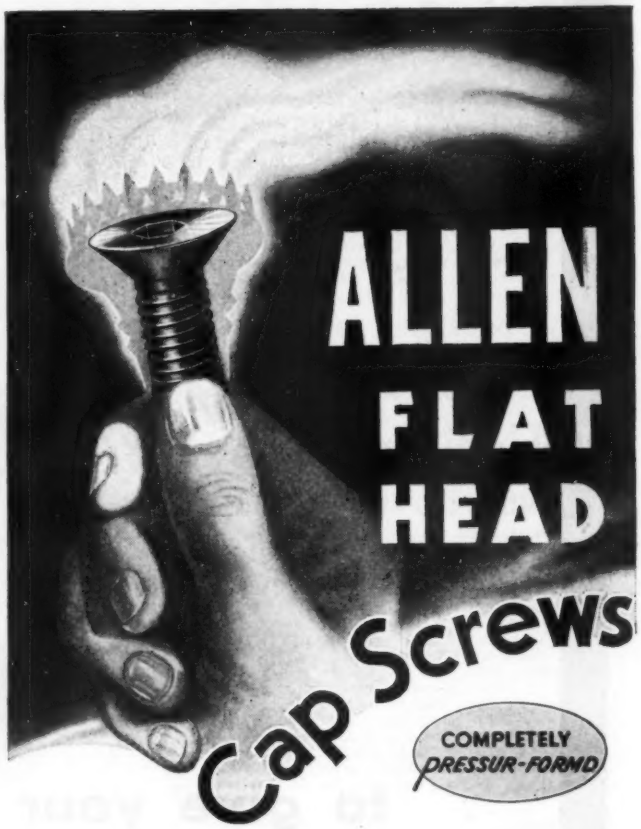
GRAY-MILLS CO., 1953 Ridge Ave., Evanston, Ill.

PROMPT DELIVERY

Complete Portable

PUMPING UNITS

FRACTIONAL H. P. PUMPS
INDUSTRIAL FLUID REFRIGERATING SYSTEMS
PARTS CLEANING SYSTEMS

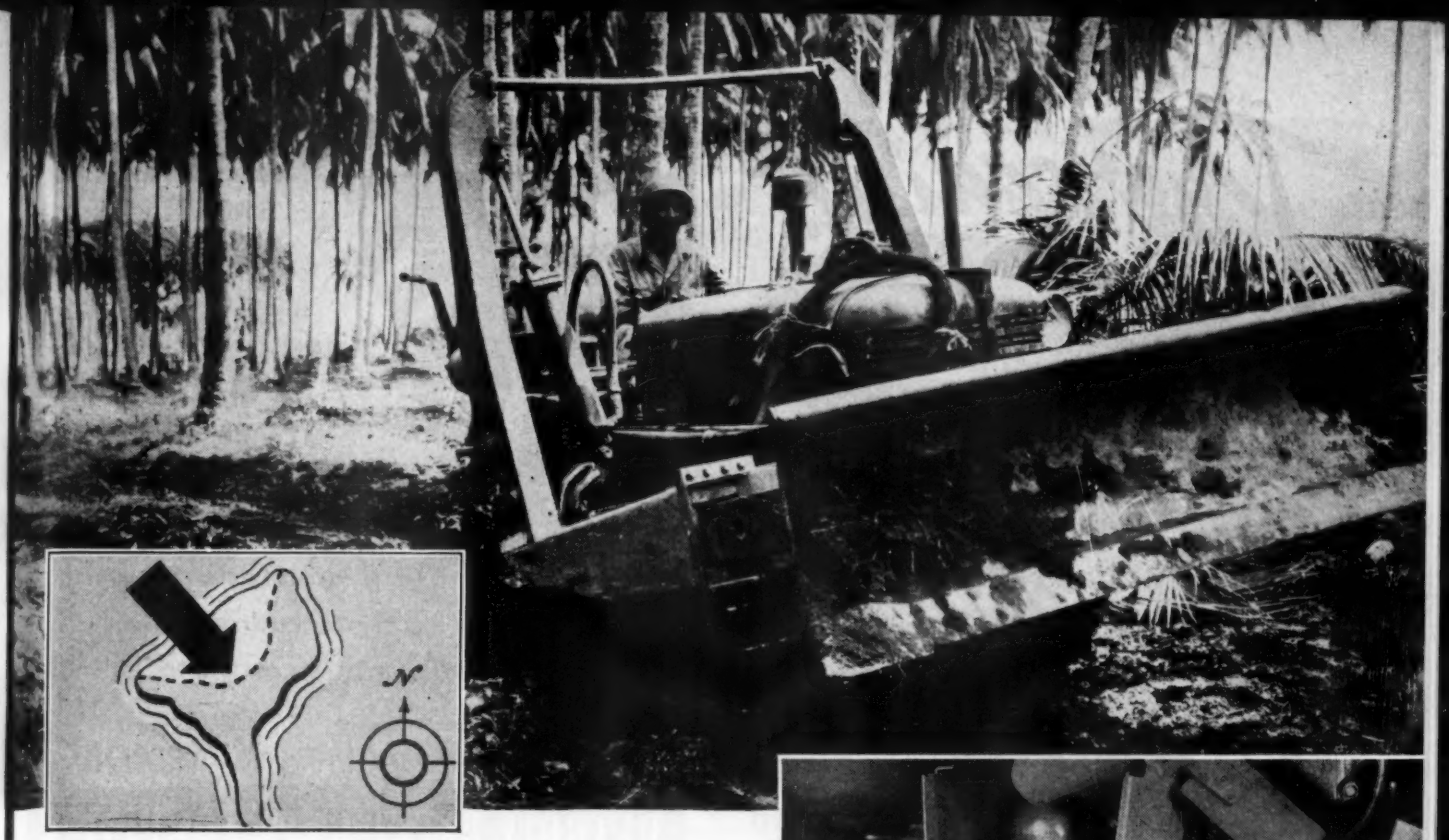


This Cap Screw design lights your way to attain great rigidity of grip, while retaining flush surfaces of machine parts and assemblies. Sets up flush and true when seated in countersunk hole.

It's *"pressur-formd"* by Allen processes from end to end so the steel-fibres are continuous and uncut under the head, to accentuate strength of the socket. Threads also are *pressur-formd,* which makes the axial fibres of the steel conform to the contours of the thread profile, with greater resistance to stripping. Thread tolerances are held to a high Class 3 fit, for a high degree of frictional holding-power under vibration.

Obtainable as a part of the ALLEN Line from your local Industrial Distributor. *Ask for samples,* with dimensional data on available sizes.

THE ALLEN MFG. COMPANY
HARTFORD, ★ **ALLEN** ★ CONN.



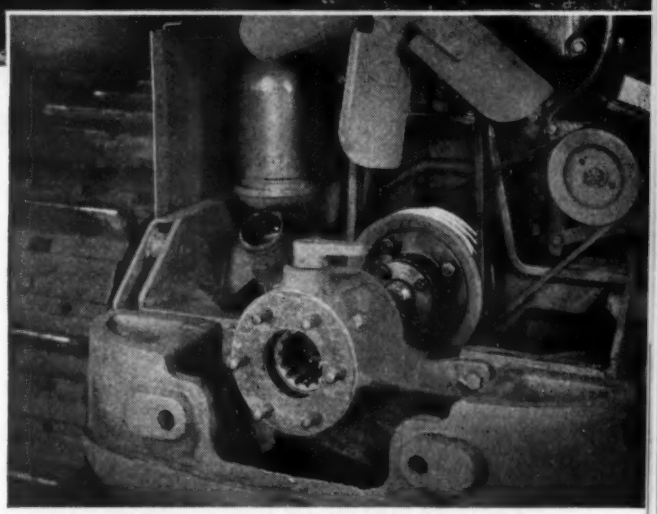
Ohio Gears Help Give the Push on Rendova Island

Among the first pieces of equipment landed for the "clean-up" of Rendova Island were the giant Baker Bulldozers. These Bakers, mounted on Allis Chalmers tractors have been doing their stuff to the Army's satisfaction right along. So, whenever there is a tough bulldozer job, Bakers get it.

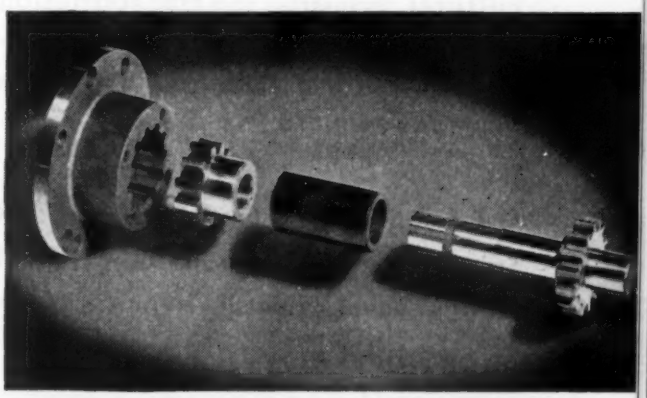
One important part of the Bulldozer mechanism is the hydraulic pump, used to raise and lower the blade. It can't be big, but it has to be strong, tough and long lived. The drive gears, particularly must stand up under the hardest kind of use. Years ago, Baker engineers found that Ohio Gears gave them the kind of service they required and Ohio Gears have been standard ever since.

Now, they have this to say: "Ohio Gears have been giving excellent service under hard usage during the many years we have used them in connection with the front hydraulic pump installations on Baker Bulldozers. They are subjected to exceptional wear and abuse on construction jobs and even more so on the various fronts of the war."

Serving Baker Bulldozers in wartime and peacetime is another example of the part Ohio Gear Products play in better power transmission for American industry.



LOCATION OF GEARS ON FRONT PUMP DRIVE
(Pump and Radiator Removed).



"EXPLODED" VIEW SHOWING DETAILS OF GEAR ASSEMBLY.

THE OHIO GEAR COMPANY

1326 EAST 179th STREET — CLEVELAND, OHIO

Representatives

*NEW YORK CITY, N. Y.
Patron Transmission Co.
154-156 Grand Street

NEW ENGLAND
George G. Pragst
332 Main St., Pawtucket, R. I.

*LOS ANGELES, CALIF.
J. W. Minder Chain & Gear Co.
927 Santa Fe Avenue

GRAND RAPIDS 8, MICH.
W. H. Slaughter
3753 Division Ave. S.

*PITTSBURGH, PA.
Standard Machinists Supply Co.
South 2nd and McKean Street

DETROIT, MICH.
George P. Coulter
322 Curtiss Building

*MINNEAPOLIS, MINN.
Industrial Supply Co.
717 S. Eighth Street

BUFFALO 16, N. Y.
F. E. Allen
1315½ Hertel Ave., Room 9

*KANSAS CITY, MO.
Kansas City Rubber & Belting Co.
712 Delaware Street

*SAN FRANCISCO, CALIF.
Adam-Hill Co.
244-246 Ninth St.

LOUISVILLE, KY.
Alfred Halliday, 330 Starks Bldg.

INDIANAPOLIS 4, IND.
A. R. Young
635 N. Pennsylvania St.

ST. LOUIS, MO.
St. Louis Tool Co.
2319 N. Ninth Street

Stocks carried.

OHIO GEARS

Prerequisite

to making gears...

experience and proper facilities

THIS much must be said about gears—if you want them made efficiently, economically and accurately, go where complete modern facilities, long years of experience and a top-notch reputation give you a full guarantee of satisfactory results.

Fairfield, known for more than 25 years as makers of fine gears, processes gears for leading manufacturers of agricultural, industrial and transportation equipment. It pays to familiarize yourself with Fairfield's gear making and engineering services.

Since 1919...

GEARS MADE TO ORDER

Spiral • Spur • Herringbone • Differential
Straight bevel • Helical • Hypoid • Worm

FAIRFIELD MFG. CO.
307 So. Earl Ave.
Lafayette, Ind.

ARMY E NAVY

FAIRFIELD for FINE GEARS

PRECISION GEARS

AS SMALL AS 5/16" ARE BEING PRODUCED BY DETROIT BEVEL GEAR

★

Gears of all types are manufactured exactly to your specifications in sizes up to 16".

Supplied in any desired Material

DETROIT BEVEL GEAR COMPANY

ARMY E NAVY

8132 JOSEPH CAMPAU AVE.
DETROIT 11, MICH.

Makers of Quality Gears for 30 Years

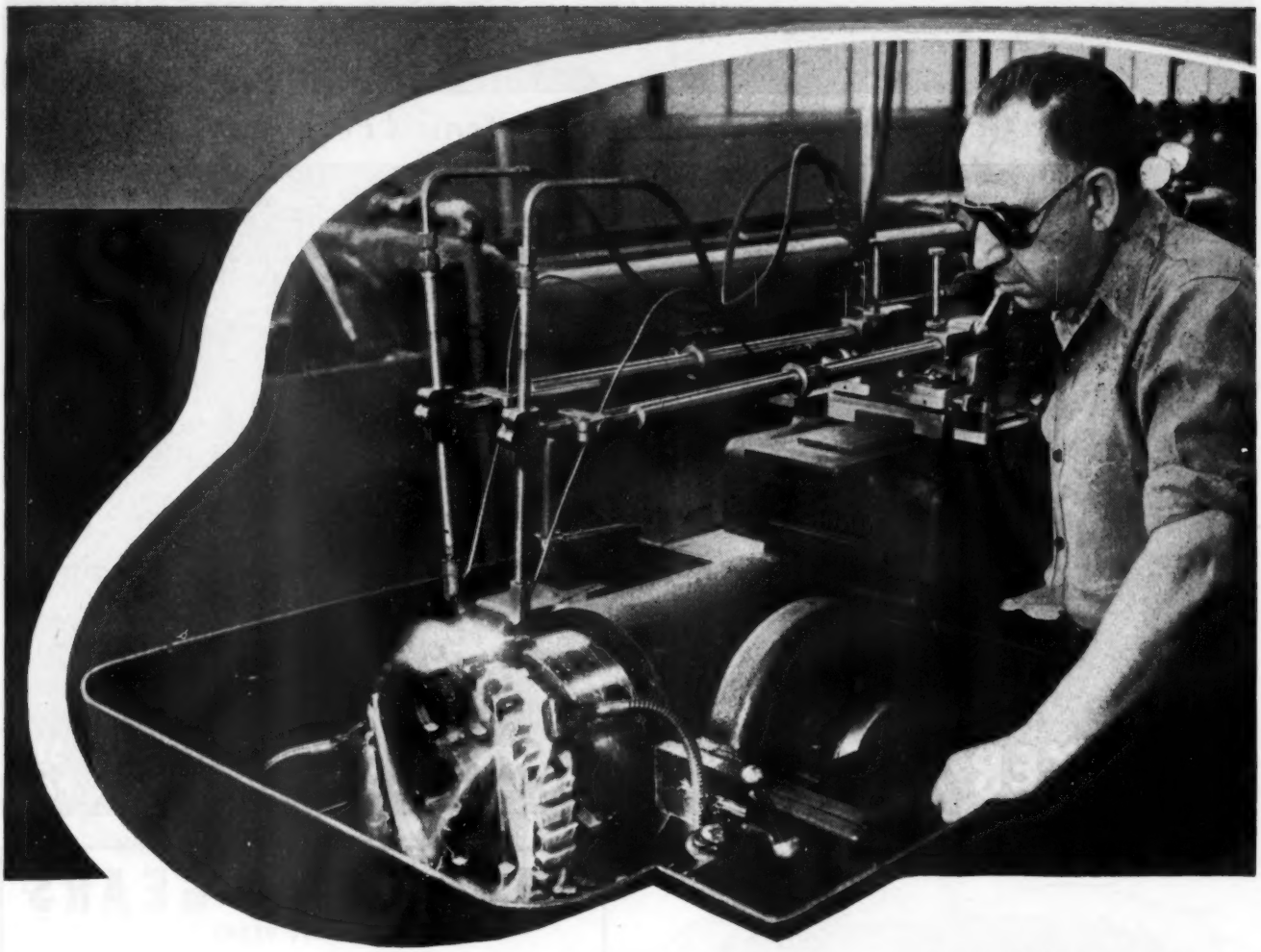
GRANT GEARS

"64 YEARS" MANUFACTURING GEARS

Despite the continued growth of our gear business we are still in position to give each customer the attention they have a right to expect.

We carry a complete stock of standard cut gears and can furnish special gears to your specifications.

GRANT ESTABLISHED 1877 GEAR BY GEO. B. GRANT **WORKS**
BOSTON, MASS.



COME TO SIER-BATH for PRECISION GEARS requiring teeth of maximum hardness

SIER-BATH's facilities for flame hardening are available for the production of gears having a maximum of wear resistance. Modern flame hardening equipment assures tooth hardness with minimum distortion.

Flame hardening is but one of many modern facilities in the SIER-BATH gear plant which enable SIER-BATH to render a complete, prompt service in producing tough, long-lived precision gears to any specifications. Gears of all types from 2" to 52" in diameter are our specialty. Submit your specifications.

PROMPT DELIVERIES ASSURED

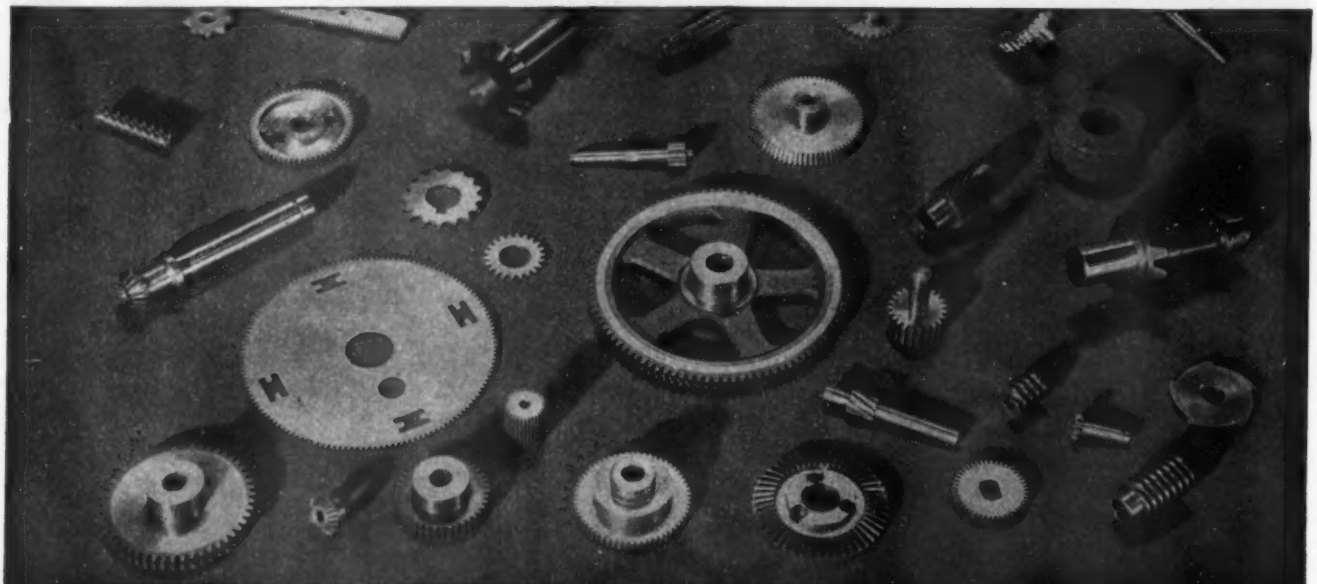
SIER-BATH GEAR CO.

9254 HUDSON BOULEVARD — NORTH BERGEN, N. J.

Incorporated

The Doorway to 38 years experience in making Precision Gears

Quaker City Gears Are Rolling with the Armed Forces on All Fronts



QUAKER CITY GEAR WORKS 1910-32 N. FRONT ST. PHILADELPHIA, PA.

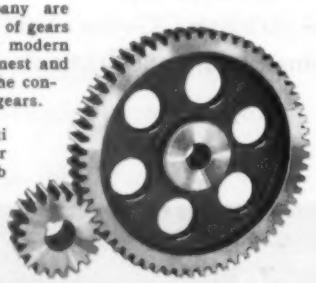
CINCINNATI GEARS
GIVE *Distinguished Service*
IN "JOB PERFORMANCE"

- ★ SPUR
- ★ BEVEL
- ★ HELICAL
- ★ SPLINE
- ★ WORM
- ★ SPECIAL

In designing your new machines or other products requiring gears . . . give yourself the benefit of the many advantages of CINCINNATI *"Gears . . . Good Gears only."*

The Cincinnati Gear Company are specialists in the manufacture of gears to meet specific needs. Our modern plant is equipped with the finest and most accurate equipment for the control and production of GOOD gears.

For over forty years Cincinnati Gears have been selected for distinguished service in job performance . . . Why not consult the Cincinnati Gear Company for your gear needs.

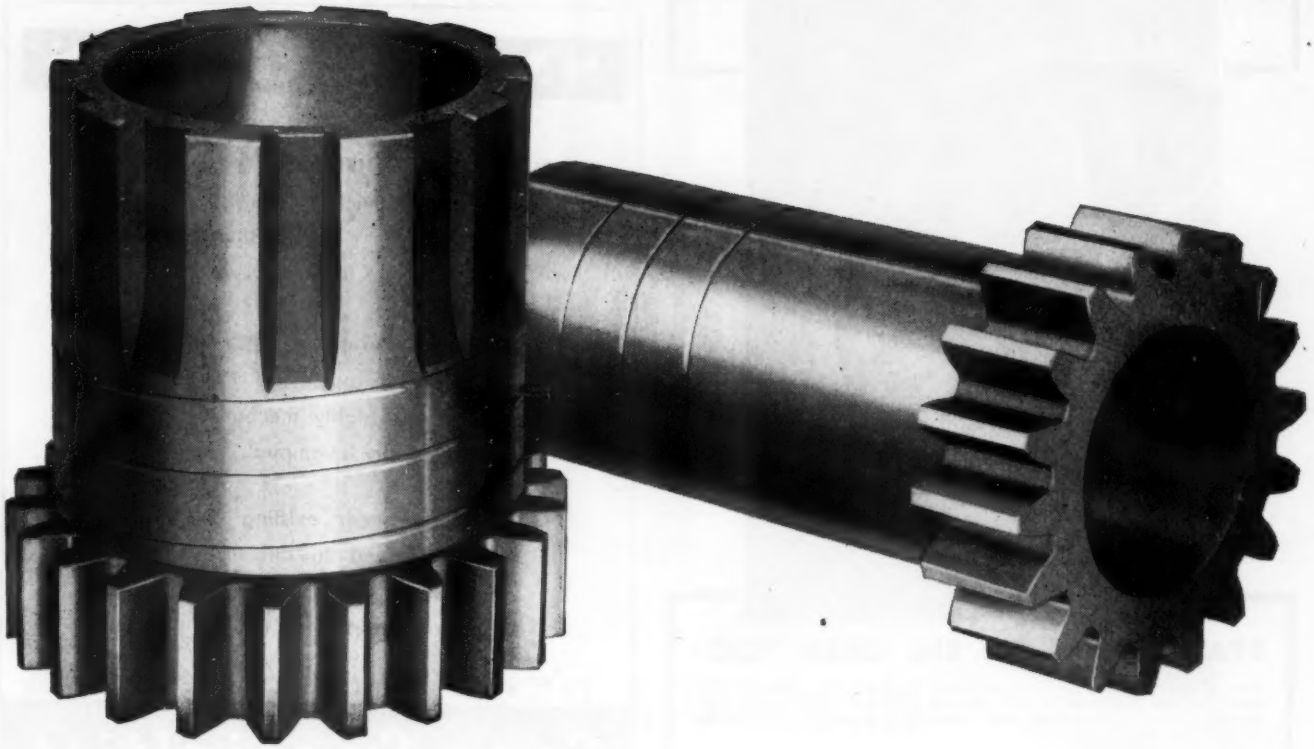


THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

GANSCHOW GEARS
FOR SIXTY YEARS
Spur—SPEED REDUCERS—Worm
ALL TYPES OF CUT GEARS
GANSCHOW GEAR CO., 18 N. Morgan St., Chicago

BRAWNY GEARS
PROMPT
ECONOMICAL SERVICE
ALL TYPES, MATERIALS
AND QUANTITIES
Ask for Estimate
BRAUN GEAR CO., 1590-1608 Atlantic Ave., Brooklyn, N. Y.

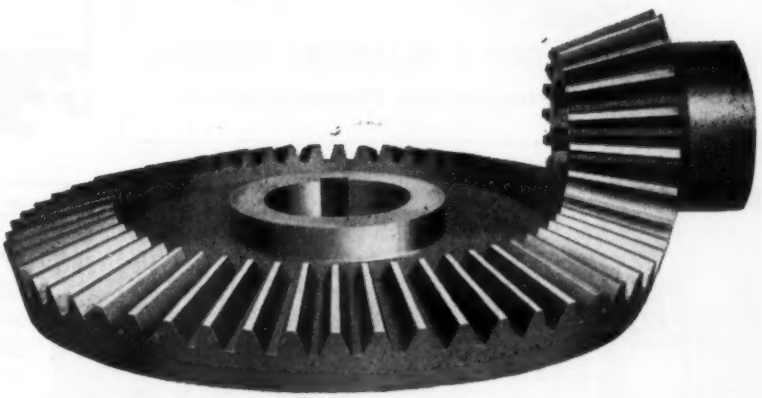
GEAR CUTTING MACHINES
New Design
New Features
New Advantages
NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*



Gears *to your specifications*

Spur Gears
Helical Gears
Splined Shafts
Worms
Worm Gears
Bevel Gears
Miter Gears
Sprockets
Ratchets
Racks
Lead and Feed Screws

Adams Gears are produced with the finest production and inspection equipment obtainable and they can be furnished to your most exacting requirements.



THE ADAMS COMPANY

1942 BRIDGE STREET — DUBUQUE, IOWA, U.S.A.

1883 — Our 61st Year — 1944

STAHL TAKES ON BIG ONES, TOO!

Size of gears places no limit on Stahl service. Big ones or little ones, we are equipped to take on all comers — and deliver the goods to your specifications and complete satisfaction. Try Stahl for YOUR GEARS. NOW.

Write, phone or wire specifications covering your gear requirements and get a Stahl quotation.

THE STAHL GEAR & MACHINE CO.
3901 Hamilton Ave. Cleveland, Ohio

SMALL GEARS

SPURS • HELICALS • BEVELS
(Straight & Spiral)
WORM GEARING • THREAD GRINDING
(14 to 96 D. P.)

As manufacturers of high precision small gears for numerous vital controls used in this highly mechanized war, we are literally 'swamped'.

Therefore, under existing conditions, we are forced to minimize further commitments unless they have W.P.B. urgency support.

Gear Specialties
MANUFACTURERS
CHICAGO

2600 W. Medill Av. Ph. Hum. 3482

BEVEL GEAR RATIO

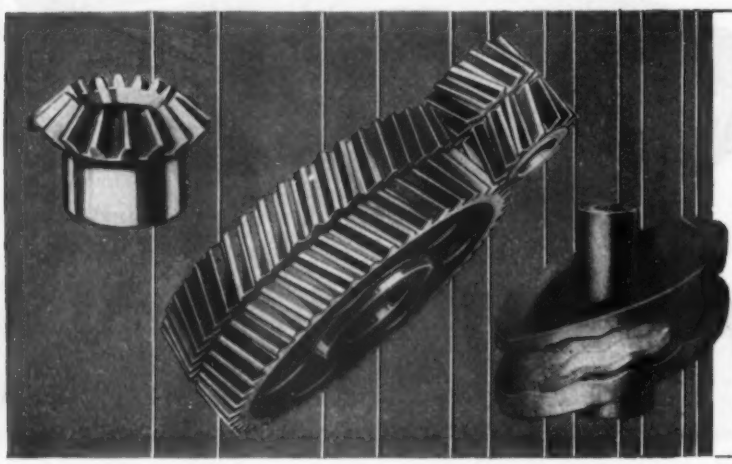
can be changed by merely changing the pinion.

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

QUALITY GEARS CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.



GET YOUR QUOTATION *from* "HARTFORD"

GEARS of every description cut to order
GEAR, CAM and THREAD grinding
AERONAUTICAL PARTS on contract basis

Send blue prints or samples for estimate. Accuracy of work guaranteed to your specifications.

THE HARTFORD SPECIAL MACHINERY COMPANY
HARTFORD CONNECTICUT

New Engineering and Manufacturing Developments make possible

A CLOSER APPROACH TO PERFECTION IN GEARS

FOOTE BROS. "aircraft quality" gears offer the major advantages of greater mechanical efficiency, lighter weight, longer life, greater compactness and quieter operation.

Before war demanded the production of high precision gears in tremendous quantities, it was possible to attain such extreme precision only by laboratory methods—mass production was deemed impossible.

Today at the plants of Foote Bros., these "aircraft quality" gears in quantities sufficient to power the world's greatest air armada are rolling off production lines—each dimension held to an amazingly close tolerance. Such production has meant a new approach to gear manufacturing techniques.

If the machines or equipment you plan to produce when the war is won requires gears, these new developments will offer you new advantages in the economical transmission of power.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago 9, Illinois

A booklet containing information and engineering data on "aircraft quality" gears is now being prepared. If you would like to have a copy as soon as it is ready, ask for one.

FOOTE BROS.

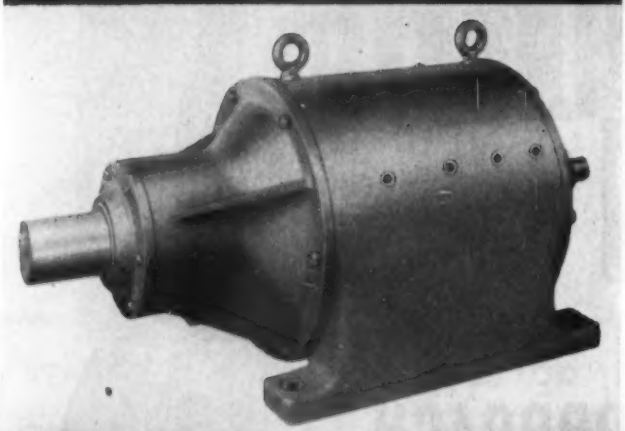
Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
AM-10, 5225 S. Western Blvd., Chicago 9, Illinois

Please send me a copy of the Engineering Bulletin on "Aircraft Quality" Gears as soon as it is available.

Name.....*Position*.....
Company.....
Address.....
City.....*State*.....

PLANETARY GEAR SPEED REDUCERS



HORIZONTAL DRIVE, AVAILABLE IN 35 SIZES, WITH A RATIO RANGE OF 10 TO 1200:1, FROM ¾ TO 75 HORSEPOWER

FOR LARGE SPEED REDUCTIONS AND GREATEST EFFICIENCY

SINCE 1903... D.O.James planetary Gear Reducers have been used on many industrial applications where large reductions were needed. The superior gear arrangement of this type of reducer obtains highest ratios and greatest efficiency. They are most compact and occupy very little floor space. The equal balance and similar revolving direction of the rolling contact of the gear teeth produces the maximum reduction with the minimum number of gears.

TODAY... Modern manufacturing methods and facilities, under the supervision of an experienced operating personnel, assure the utmost efficiency and durability to D.O.James Gears and Gear Speed Reducers.

D.O.James

ESTABLISHED 1888 MANUFACTURING CO.
1140 WEST MONROE STREET · CHICAGO 7, ILL.

LOCALITES
for Quick Accurate Seeing of CRITICAL WORK TASKS

High Level Illumination Instantly Adjustable to Any Position

MODEL 3267-U-104
Concentrates up to 250 footcandles illumination directly on the work-area. Recommended for small part assembly, inspection and certain precision machining.

MODEL 3267-H-102
Concentrates up to 200 footcandles illumination directly on the work-area. Recommended for small machine tools.

MODEL 3470-P-104
Concentrates up to 300 footcandles illumination directly on the work-area. Recommended for bench and table operations.

MODEL 3267-C-104
Concentrates up to 150 footcandles illumination directly on the work-area Recommended for larger machine tools.

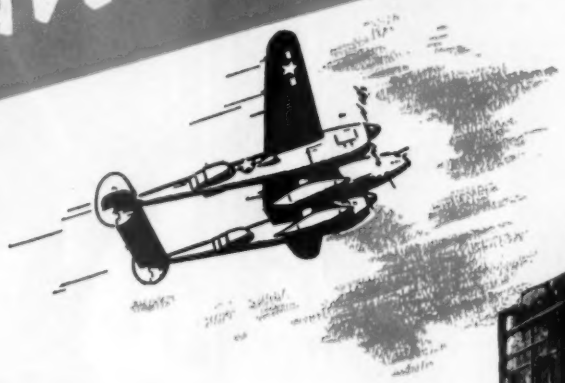
REQUEST FREE BOOKLET *Today!*
Explains the efficient and economical results of Balanced Lighting and how to obtain it. Ask for folder BL-3-AM.

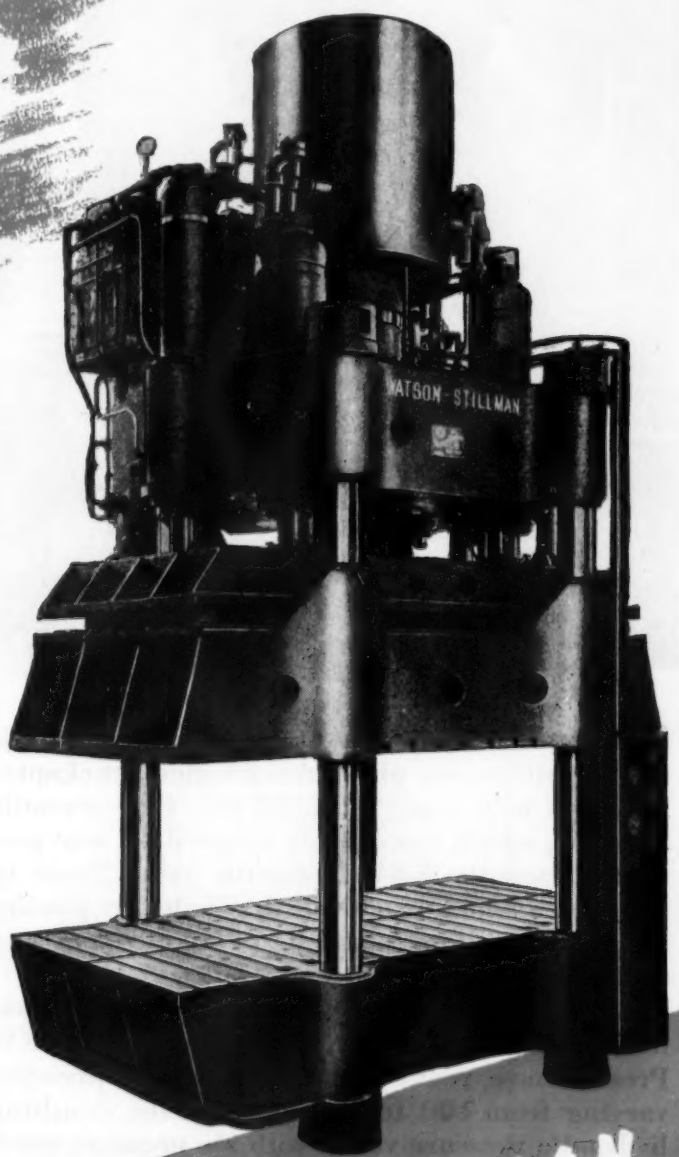
BALANCED LIGHTING fostoria
GENERALITES for Overall Lighting • LOCALITES for Light ON the Job
Trade Mark Reg. U. S. Pat. Off.

NEMA

FOSTORIA INDUSTRIAL SERVICE
Factory and General Offices • Fostoria, Ohio
Affiliated Manufacturers:
Southern Industries, Inc., Atlanta
Newmac Co., Ltd., San Francisco
Amalgamated Electric Corp., Ltd., Toronto, Canada

Deep-Drawing Operation On W-S Double-Action Press SAVES CRITICAL HOURS





THIS giant 800-Ton Watson-Stillman Hydraulic Forming Press is helping to speed delivery of aircraft to war fronts overseas. Equipped with deep-drawing dies, it turns out droppable fuel tanks which make possible the flying of Lockheed P-38 Lightning fighter planes direct from factory to European destinations. By means of double-action dies designed especially for this production operation, performing, drawing, and trimming of blanks are accomplished simultaneously. In this way, important savings in production time are effected.

The same features that enable this press to help speed output of aircraft parts are available in all Watson-Stillman presses for extrusion, bending, straightening, assembling, forcing, molding, and other metal-working operations. Whenever hydraulic equipment is needed for any purpose, be sure to consult Watson-Stillman engineers for recommendations backed by nearly a century of experience. Write for Bulletin 110-A to Watson-Stillman Company, Roselle, New Jersey.

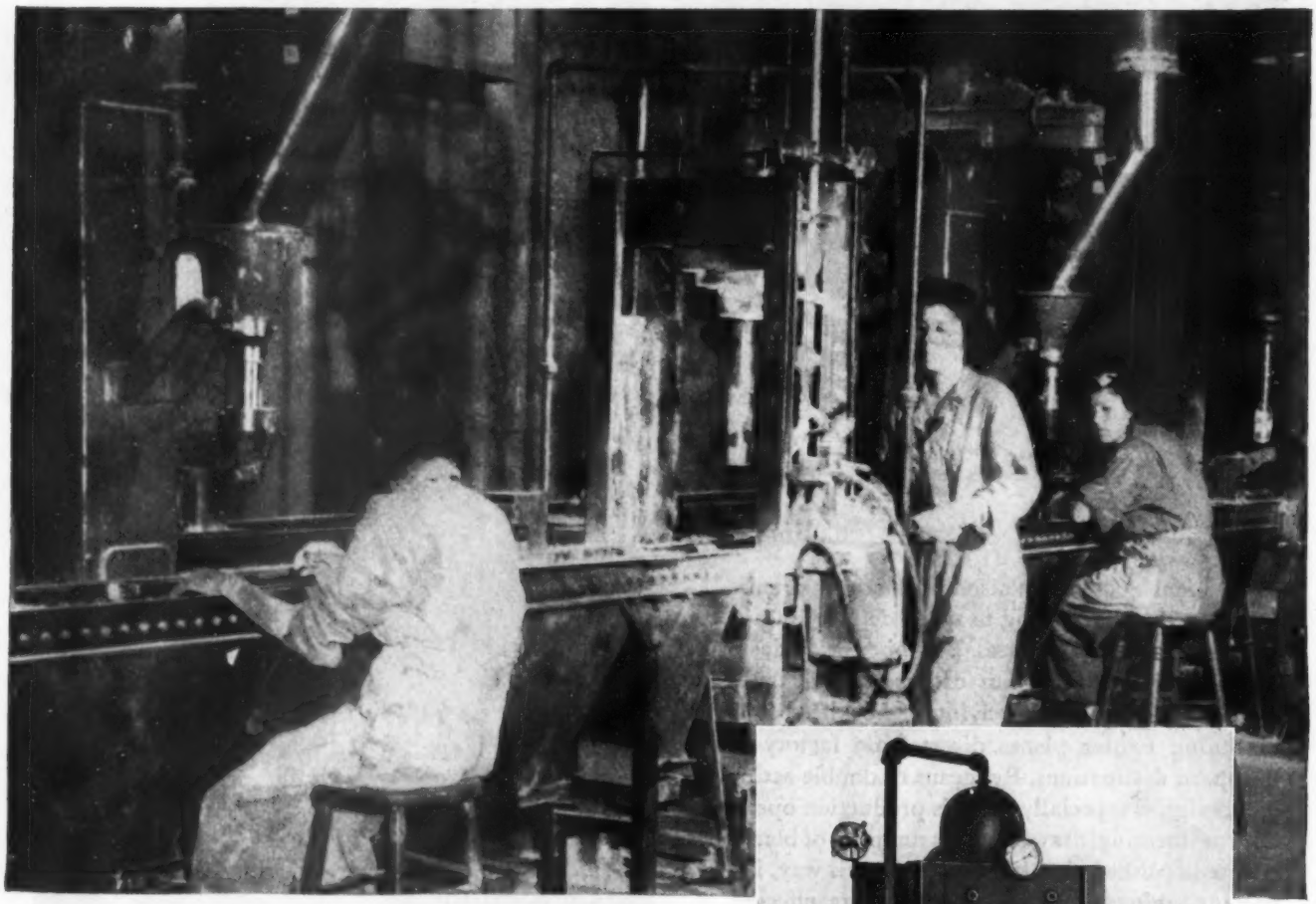
This W-S Double-Acting Hydraulic Forming Press has a capacity of 800 tons; platens measure 12 ft. x 6 ft., opening, 4 ft., 4 in.; stroke 3 ft., 7 in.; height, 22 ft., 6 in. A self-contained unit with single operating lever control.

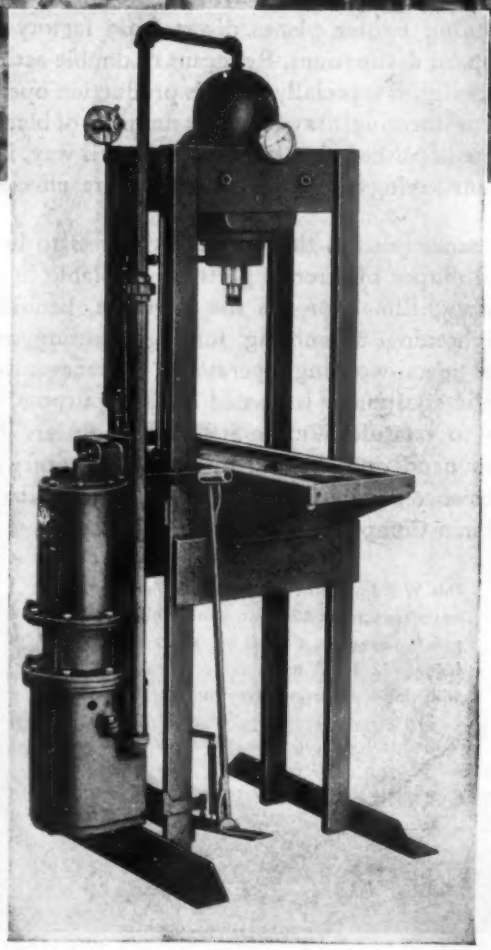
WATSON-STILLMAN

Designers and Manufacturers of Hydraulic Equipment, Forged Steel Fittings and Valves.

Versatile KRW PRESSES

KRW Presses speed shell loading in one of the nation's largest arsenals.





When the history of America's Victory in this war is written, one of the most important chapter headings will read—MACHINES. One versatile machine, which was quickly adapted to war production, was the KRW Hydraulic Arbor Press. In many an arsenal, it has put the "fight" or powder in untold millions of shells of many types and calibers.

In literally hundreds of other widely varied manufacturing operations, basically similar KRW Presses have reduced costs. Using air pressure varying from 100 to 225 pounds, the resulting hydraulic pressure varies with air pressure used. A built-in air regulator permits exact duplication of pressure on every stroke—important on many operations.

KRW Hydraulic Presses are available in either standard form or specially built to handle a particular operation, for both vertical and horizontal action. We also manufacture suitable air compressors. Write for our Hydraulic Arbor Press Bulletin.

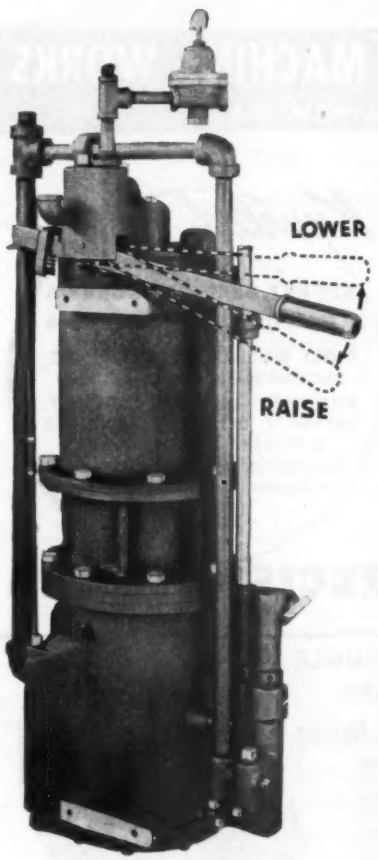
speed shell production

EQUIPPED WITH KRW SPEEDI-BOOSTER,

...THEY HAVE HELPED OUR ARMED FORCES GET *Enough* AND *On Time*

THE REASON WHY KRW PRESSES ARE FAST AND ACCURATE

The KRW Speedi-Booster eliminates the need for the conventional Capstan wheel or pumping lever. Instead, it uses compressed air as the motive power operating the ram. Because the compressed air is controllable through a pressure regulator, any desired tonnage pressure at the ram can be obtained and duplicated. Ram movement (up, down or stop) is instantly controlled with the slightest fingertip movement of the lever.



THE KRW *Speedi-Booster*

AVAILABLE TONNAGE PRESSURES

25-50-60 TON PRESSES

AIR PRESSURE	7" AIR CYLINDER		9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder	2" Oil Cylinder	1¾" Oil Cylinder
	10 to 22 Tons	14 to 29 Tons	17 to 35 Tons	23 to 47 Tons

75 TON PRESS

AIR PRESSURE	9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder
	25 to 51 Tons	33 to 68 Tons

Write Today for the KRW HYDRAULIC PRESS CATALOG

SINCE 1916 KRW A MARK OF DEPENDABILITY

K. R. WILSON

10 LOCK ST., BUFFALO 2, N. Y.

PRODUCTO CAN SHIP PROMPTLY

from 5 strategic points *

PHONE THE FOLLOWING

1. Bridgeport, Conn.....Bridgeport 4-9481
2. Detroit, Mich.....Plaza 3101
3. Cleveland, Ohio.....Express 1133
4. Indianapolis, Ind.....Lincoln 1696
5. Los Angeles, Cal.....Trinity 9827

Producto Die Sets and Accessories can be assembled and shipped quickly from any of the above convenient points assuring a coast to coast service which can be depended on for completeness, efficiency and time savings.

SALES OFFICES AT YOUR SERVICE by PHONE

New York City.....Canal 6-6131
Buffalo, N. Y.....Cleveland 1110
Syracuse, N. Y.....Syracuse 3-1181
Philadelphia, Pa.....Radcliffe 1467
Dayton, Ohio.....Taylor 5201

SPECIAL DIE SETS

If your requirements call for Special Die Sets and Bolster Plates—get in touch with Bridgeport or Detroit for quick service.

Send for Complete Specifications as contained in No. 9 Catalog.

The
PRODUCTO MACHINE COMPANY
940 HOUSATONIC AVE. BRIDGEPORT, CONN.
3017 MEDBURY DETROIT, MICH.

NO SKILL REQUIRED *to produce perfect stampings with* WALTHAM SUB PRESSES

Arch Type Sub-press

Valuable time and money savings can be made with these sturdy, accurate sub presses. Even in the hands of unskilled operators, cleanly cut stampings are assured. The fact that the work produced requires no further finishing or hand work before assembly means that production can be greatly speeded up.

Accuracy is easily maintained in WALTHAM SUB PRESSES through a simple adjustment for wear. These convenient units are available in sizes up to 6" plunger diameter in arch and overhang types.

SEND FOR DETAILS!

WALTHAM MACHINE WORKS
WALTHAM, MASS

DANLY *Knurled*

All Die Makers' Supplies
Danly Commercial Sets
Danly Special Sets

SOCKET-HEAD CAP SCREWS
HOLLOW SET SCREWS
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue, Chicago, Illinois
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
DUCOMMUN METALS & SUPPLY CO.
Los Angeles • San Francisco

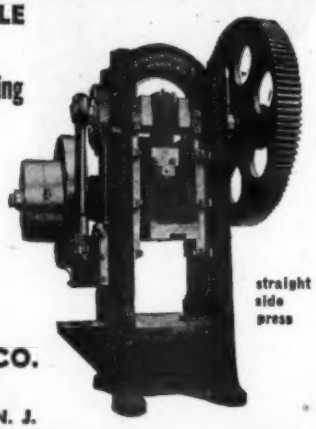
DANLY PRECISION DIE SETS

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.



straight side press

ZEH & HAHNEMANN CO.
180 Vanderpool Street
NEWARK N. J.

Die of *Speed Treat* Steel Cost Less;

Gave Twice the Production!

CASE STUDY

User: **Standard Railway Equipment Mfg. Co.**

Application: **Corner flanging dies for forming patented Murphy ends and sides for railway cars.**

End Use: **Dies cold form 3/16″ and 1/4″ plate on 1,000-ton press. Abrasion is excessive because of scale on plate. Female die is approximately 15″ high x 9″ wide x 10″ deep.**

Heat-Treatment: **Pack-hardened to 52-54 Rockwell "C" scale.**

Result: **Dies were formerly made of nickel cast iron and never produced in excess of 100,000 pieces. Dies made from *Speed Treat* open hearth medium carbon hot rolled plate have produced a minimum of 200,000 pieces per die.**

Machining costs have been radically reduced with consequent lowering of tool costs. The satin finish on the impression surfaces was produced with far less grinding and polishing.

***SPEED TREAT* Plate Provides.....**

- Better Finish
- Lower Machining and Tooling Cost
- Ideal Response to Heat Treatment
- Negligible Heat Treat Distortion
- Reduced Weight
- As Much As 60% Lower Material Cost
- Savings in Production Time
- Lowest Ultimate Cost

Speed Treat **plate, an open hearth medium carbon steel, affords greater economy to tool and die makers than most high carbon steels. It is readily machinable, has high tensile strength and constant uniformity and responds to all types of heat treatment including selective surface hardening.**

Why not investigate this economical and practical steel for your own use? Send for name of your local *Speed Treat* plate distributor and a copy of Catalog No. 1243.

W. J. HOLLIDAY & CO.

***Speed Case*—*Speed Treat* Plate Division**
Hammond, Indiana
"Established 1856"

Hammond and Indianapolis, Indiana — ***Distributors in Principal Cities***

Quality Controlled *Speed Case* and *Speed Treat* Steel Is Available In All Common Plate Sizes

METAL STAMPINGS IN SMALL LOTS

There is no other method of producing metal stampings in small lots that can equal the process originated by Dayton Rogers Mfg. Co. No matter how intricate the design or how small the quantity requirements, we can show you a substantial saving.

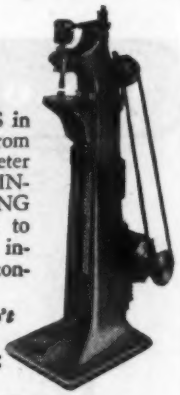
Write for illustrated booklet No. 176-1

DAYTON ROGERS MFG. CO.
MINNEAPOLIS MINN.

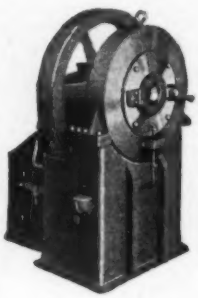
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



THE
TORRINGTON
ROTARY
SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.
56 Field Street Torrington, Conn.

"ROCKWELL" HARDNESS TESTER

These new improved type testers available from stock.

Made by us for 23 years and still made by us only.

WILSON
MECHANICAL INSTRUMENT CO. INC.
Concord Ave., New York 54
An Associate Company of American Chain & Cable Company, Inc.

BAUMBACH
STANDARDIZED DIE SETS

BETTER-MADE
DIE SETS
AT LOWER COST

46 Styles—195,000 Sizes

E. A. BAUMBACH MFG. CO.
Machined Steel Semi-Steel
Send for our new catalog
1812 South Kilbourn Ave., Chicago, Ill.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
The V & O Press Company, Incorporated
HUDSON, NEW YORK

"DIE-LESS" DUPLICATING

BENDER

BRAKE

NO DIES!

DI-ACRO PRECISION MACHINES "DIE-LESS" DUPLICATING

"DIE-LESS" DUPLICATING might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines — Shears, Brakes, Benders — especially when used as a continuous, integrated production process.

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided, deliveries speeded up. *Write for Catalog.*

SHEAR

O'NEIL-IRWIN MFG. CO. 311 EIGHTH AVE. SO., MINNEAPOLIS 15, MINN.

PRICE, Chicago
$412.00
(Without Plates)
Electrically Heated Plates with Thermostatic Control, $125.00 Additional.

MODEL NO. 6441
4-Column Design
30-ton Capacity

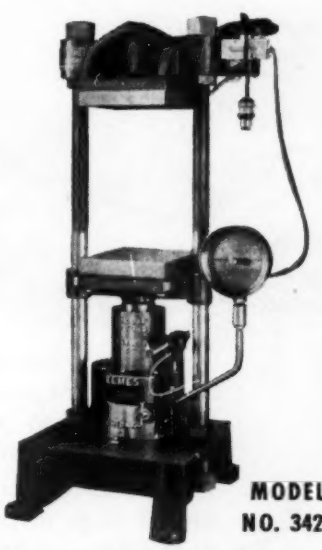
New! —this 30-ton Laboratory Press by ELMES

TO SPEED YOUR WORK OF RECONVERSION RESEARCH

Now is the time to translate those new designs of yours into actual pilot models. Government has flashed the green light on development studies, and Elmes is ready with a brand-new press to help you get the right answers. New materials, new ideas, new techniques all must be thoroughly tested and proved—and the sooner the better.

The same Elmes laboratory press that can do such an important job for you today will be a welcome addition to your plant facilities for years to come. Select the size to suit your needs. Four-column Model No. 6441 (above) has plates ten inches square, guided at all four corners for added rigidity under eccentric loads. Like two-column Model No. 3429 (right), it has an adjustable head and 6" stroke. Either can be furnished with or without hot plates, as can other larger sizes.

Send for Bulletin No. 1035A. For nearly a century, Elmes has built dependability and long-lasting durability into hydraulic equipment for exacting industrial service. Elmes Engineering Works of American Steel Foundries, 1001-1013 Fulton St., Chicago 7. Also manufactured in Canada.

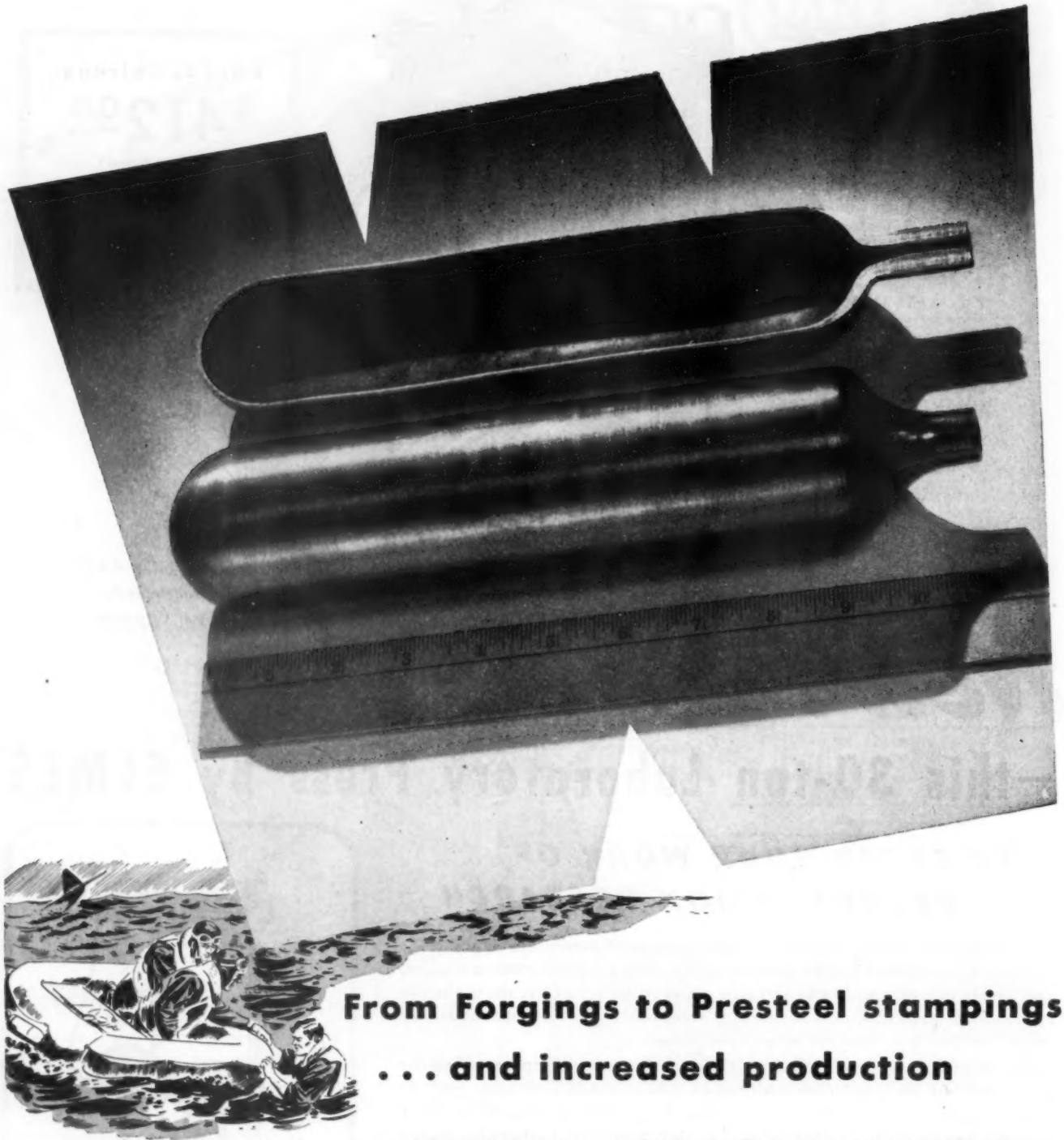


MODEL NO. 3429

20-ton, 2-column Elmes laboratory press with plates eight inches square. Price, Chicago, $168.00 (without plates). Electrically heated plates with thermostatic control, $55.00 add'l.

ELMES HYDRAULIC EQUIPMENT

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES



From Forgings to Presteel stampings . . . and increased production

These cylinders are used for inflating the life rafts of the Army and Navy. Uninterrupted production was vital, but available forging equipment was inadequate to meet the demand.

As in so many other instances, Presteel's possibilities were investigated. Worcester Pressed Steel Company now produces these cylinders in several types, drawing them from chrome molybdenum X 4130 steel, and performing a preliminary necking operation. Presteel was the first company to cold-draw life raft cylinders from this material.

Worcester Pressed Steel Company is accustomed to meeting emergencies. If your company is faced with a tough production problem, consult —

WORCESTER PRESSED STEEL CO.

210 Barber Avenue, Worcester 6, Mass.

ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883

CLECO PRODUCTION...

Keeps Pace with the Aircraft Industry's Demands

A Cleco riveter working on the famous Lockheed "Lightning"

THERE are dozens of models and sizes of Cleco aircraft riveters, many styles with handles made of steel or aluminum. These tools strike accurately controlled blows, causing the rivet metal to flow uniformly without structural deterioration. Their use insures tight rivets, and avoids damage to the metal being riveted. Write for Bulletin 85.

OTHER CLECO RIVETING EQUIPMENT

We also make an extensive line of squeeze riveters. Let us tell you about the new Type "P" triple-safe Cleco sheet holders. Our new RIV-N-JECTORS, for inserting rivets, save 90% of the rivets lost when handled by hand. Write for information.

BUY U. S. WAR BONDS AND STAMPS

POPULAR CLECO AIRCRAFT RIVETERS

E2-BV Light Riveter

D2-BW Light Riveter

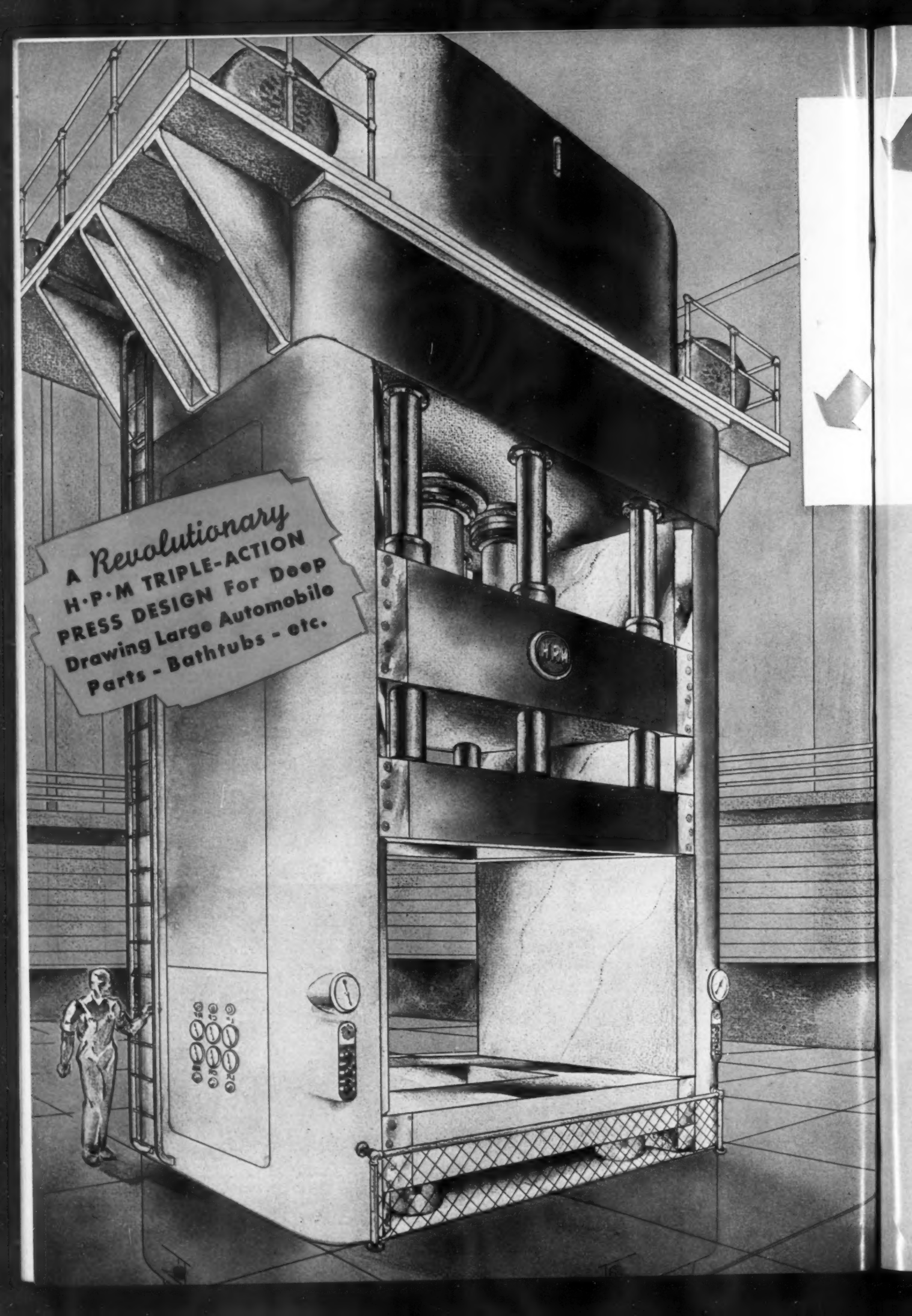
41C Yoke Riveter

Inserting Cleco Type "P" Sheet Holders

THE CLEVELAND PNEUMATIC TOOL CO.

3781 East 77th Street Cleveland 5, Ohio

Branch Offices in All Principal Cities


A Revolutionary
H·P·M TRIPLE-ACTION
PRESS DESIGN For Deep
Drawing Large Automobile
Parts - Bathtubs - etc.
H·P·M

There are SCIENTIFIC REASONS why H·P·M FASTRAVERSE PRESSES should be used for deep drawing sheet metal . . .

General Electric Company uses this 200-ton H-P-M press for drawing steel tops for electric irons.

This 400-ton H-P-M press at Acklin Stamping Co. is drawing monel tubs for dish washing machines.

International Harvester Company uses this 750-ton H-P-M press for drawing automotive oil pans.

Ford Motor Company draws the running boards for trucks and commercial cars with this H-P-M 1,000-ton press.

H-P-M hydraulic presses for deep drawing sheet metal are free from the harmonic motion of mechanically applied force. The velocity of the punch is constant during the drawing operation. This permits deeper draws than can normally be obtained with crank or cam driven presses. Sharp die impact, with its destructive results, has been completely eliminated. No longer is speed a limiting factor. H-P-M FASTRAVERSE presses are now producing deep drawn parts at speeds previously considered impractical for any type of press.

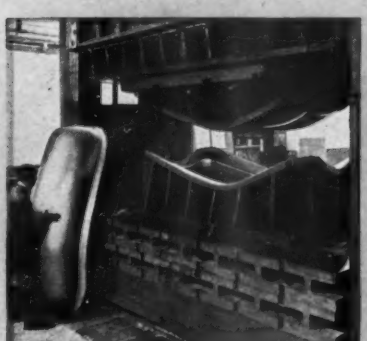
H-P-M presses automatically reverse at a predetermined pressure, guaranteeing positive overload protection. Maximum pressure can be applied at any point within the limits of the ram travel, facilitating easy and quick die set-up.

Investigate the possibilities of lowering your metal-working costs with H-P-M FASTRAVERSE presses. Write today, stating your requirements.

THE HYDRAULIC PRESS MANUFACTURING CO.

Mount Gilead, Ohio, U. S. A.

Branch Offices: New York, Philadelphia, Cleveland, Detroit and Chicago
Representatives in Principal Cities



This 750-ton H-P-M press, installed in England, is used to deep draw large metal aircraft parts.

Douglas Aircraft Company uses several of these 650-ton H-P-M presses for drawing fuel tanks for cargo planes.

HPM

All-Hydraulic Self-Contained

FASTRAVERSE PRESSES

For . . . Bending, Blanking, Coining, Drawing, Embossing, Forming, Forging, Flanging, Riveting, Straightening, Trimming.

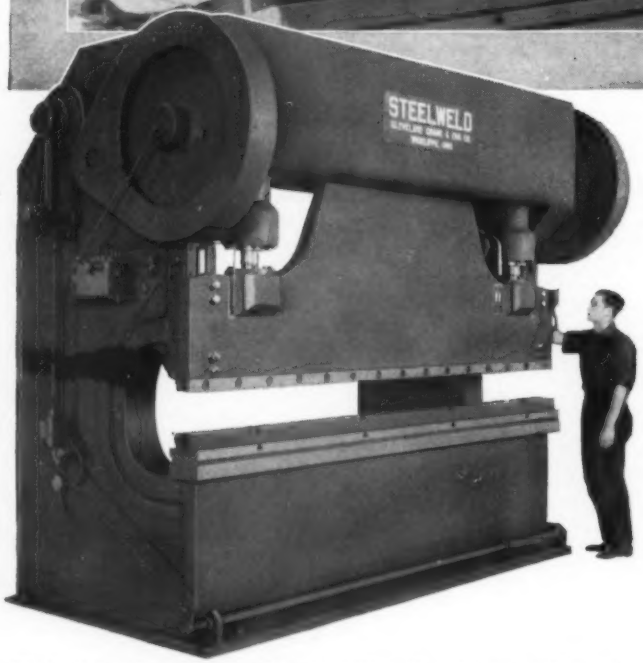


Photo at top shows Cleveland Steelweld Press forming motor housing top. Only one of many varied operations performed on this machine.

SMOOTH CURVES WITH STANDARD DIES

Smooth curves are readily formed with standard or simple dies on a Cleveland Steelweld. This is only one of the many kinds of work being performed on hundreds of these versatile presses every day.

Bending, braking, punching, blanking, drawing and corrugating operations are all done easily, quickly and accurately on any Steelweld Press.

Only a few minutes are required to change from one type of work to another. Gauges and indicators provided, make it easy to obtain identical results repeatedly, with a set of dies.

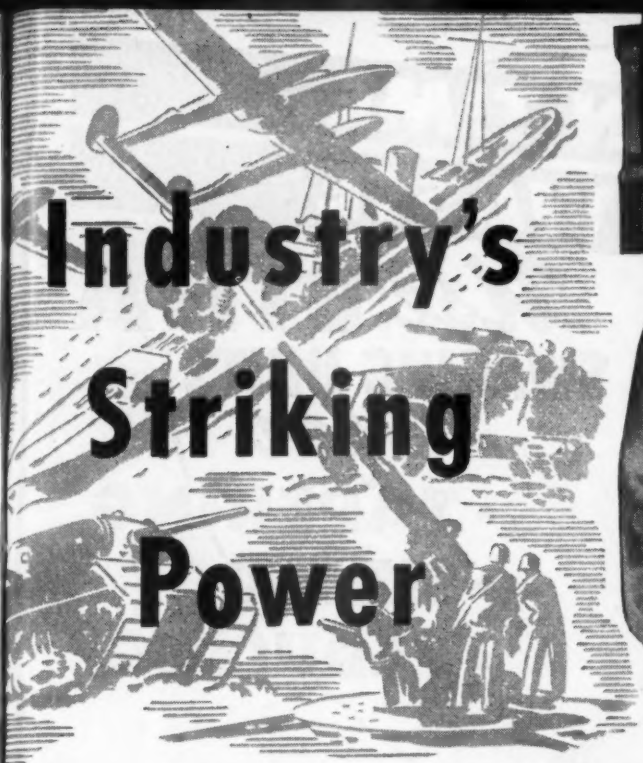
GET THIS BOOK!

CATALOG No. 2002 gives complete construction and engineering details. Profusely illustrated

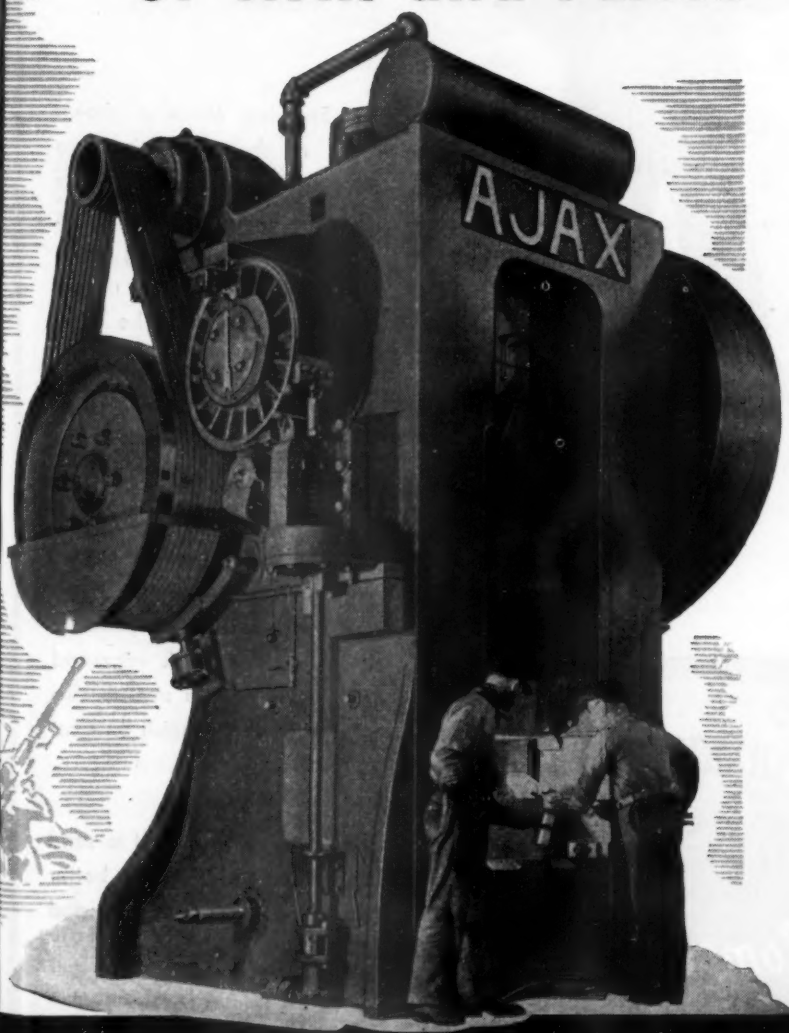
THE CLEVELAND CRANE & ENGINEERING CO.
1127 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND
STEELWELD PRESSES
GENERAL SALES AGENTS: THE CYRIL BATH CO., E. 70TH & MACHINERY AVE., CLEVELAND

Industry's Striking Power



for Forging the Products of WAR and PEACE



Today, in forge shops all over the country AJAX Forging Machines and Forging Presses are performing a vital role in the high speed production of material for war, such as parts for ships, guns, tanks, airplanes, bombs and shells—adding their full share to industry's all out effort toward speeding victory. And when that goal has been attained and the requirements for war are curtailed, with merely changing of the dies these same machines and presses will produce, economically at high production rates, accurately forged parts for automobiles, refrigerators, farm implements, railroad cars, and many, many more products to immediately meet the requirements of a new and greater peacetime economy.

Write for Descriptive Bulletins.

THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND, OHIO

621 MARQUETTE BUILDING · CHICAGO, ILLINOIS

CUT PRODUCTION TIME... REDUCE METAL WASTE

Use ETNA SWAGING UNITS *for*

- TAPERING
- SIZING
- REDUCING

ETNA Swaging Machines are regularly supplied in 3/8" to 8" diameter capacities . . . 1" to 18" die lengths. Larger units are built on order.

The ETNA Swaging Machine shown here is typical of the many that are speeding production and lowering costs for hundreds of manufacturers. In this instance the operator is pointing tube-stock prior to drawing. Because of the saving in machining time and the elimination of waste metal this ETNA unit will pay for itself many times over.

Investigate the possibilities of ETNA Swaging Units as applied to *your* operations. You can handle a great variety of parts, including hollow or solid, round, cylindrical or angular parts—and tolerances may be held within surprisingly close limits! Metal structure is improved too, and swaging imparts a smooth surface similar to a machined finish on most jobs.

Write today . . . we'll be glad to send full information on this faster, better method of handling tapering, sizing and reducing operations.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

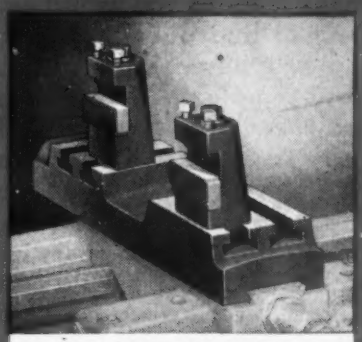
"Ask ETNA about Swaging"

The ETNA Machine Company

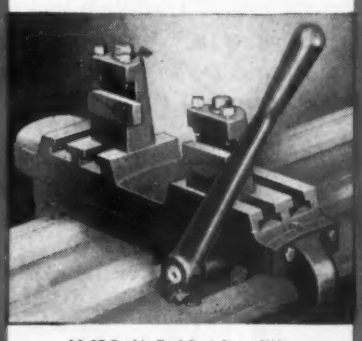
3400 MAPLEWOOD AVENUE

TOLEDO 10, OHIO

A *Logan* SCREW CUTTING LATHE BECOMES A TURRET LATHE WITH THIS ASSEMBLY



LA-29 Double Tool Post Cross Slide



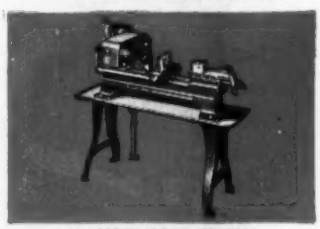
LA-25 Double Tool Post Cross Slide

DOUBLE TOOL POST CROSS SLIDES

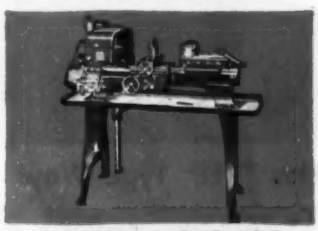
For use in connection with the Turret Assembly. No. LA-29 is interchangeable with your present Compound Rest. No. LA-25 fits on bed of your present lathe.

With the Logan 6-Position, Self Indexing Turret Assembly, your present Logan Screw Cutting Lathe becomes a *dual purpose* lathe of sustained accuracy, equally dependable for general purpose work, or for high speed production. The Logan Turret Assembly will fit the bed of your screw cutting lathe perfectly, so that tailstock and turret are interchangeable to meet the job in hand. To guarantee accuracy, the Turret Assembly is shipped to you rough bored to 9/16" so that you can finish bore it to 5/8" from your own headstock. Check with your Logan Lathe dealer regarding the advantages and the economy to be gained by equipping your present lathe with the Logan Turret Assembly.

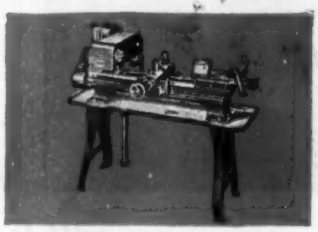
FOR MAXIMUM EFFICIENCY, USE THESE STANDARD LOGAN TURRET LATHES



No. 830 Hand Screw Machine



No. 840 Quick Change Gear Turret Lathe



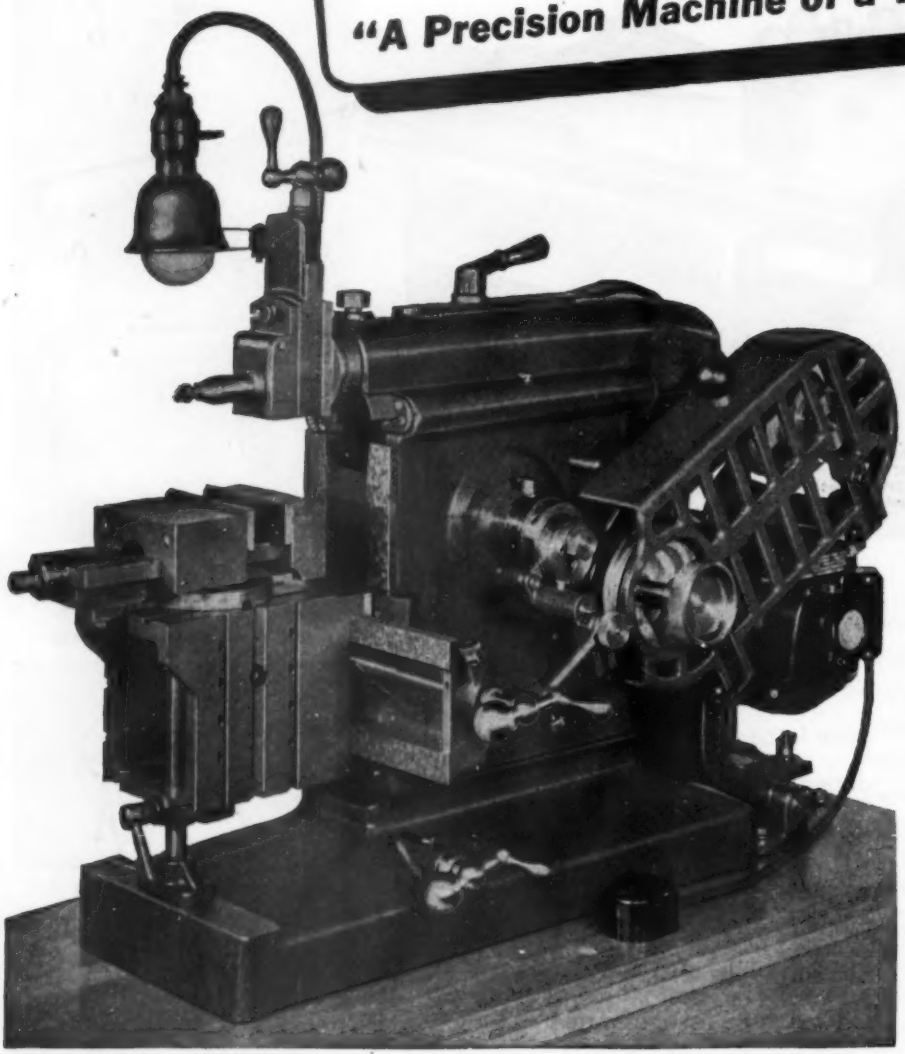
No. 850 Manufacturing Turret Lathe

Logan LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS
A NAME TO REMEMBER WHEN YOU THINK OF LATHES

AMMCO

7" SHAPER

"A Precision Machine of a Thousand Uses"



A wide variety of jobs can be done accurately, quickly, easily and economically on the AMMCO 7" Shaper.

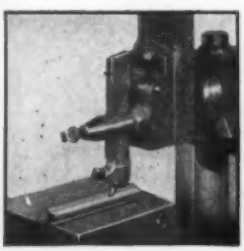
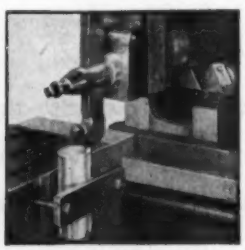
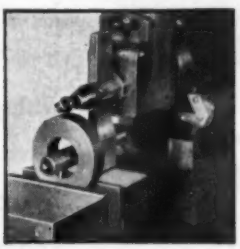
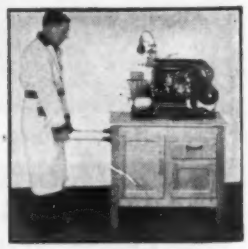
This precision machine has proved itself an essential machine tool for handling exacting jobs in industrial plants, the army, the navy, the marine corps, in mobile machine shops, government agencies, laboratories, tool makers shops, technical schools, etc.

Construction incorporates many features you would expect to find only in larger, more expensive machines... For example: WAYS of ram, tool head, and front face of the main frame are of the "VEE" type, hand scraped to insure accuracy and long life.

Available for stationary installation or as portable unit ...Portable model is mounted on sturdy maple cabinet, and can be rolled from job to job ...Just plug in to an electrical outlet, and go to work. Saves steps and time.

★

Has "VEE" Type Ways . . . Handles a wide variety of work . . . Accurate . . . Portable

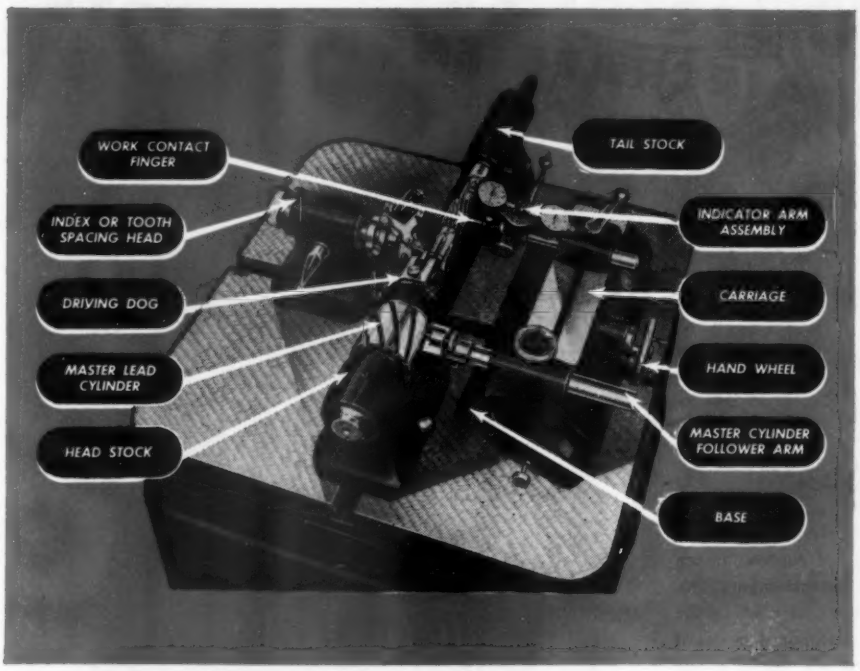





Write today for specifications and prices

ARMY E NAVY

AMMCO 2100 COMMONWEALTH AVENUE NORTH CHICAGO, ILLINOIS

CHECK GEAR ERRORS



INDEX
HELIX ANGLE
LEAD
TOOTH SIZE
ECCENTRICITY
INTERFERENCE
WOBBLE

The Red Ring Universal Gear Checker is a simple, compact instrument for accurately checking dimensional errors in either spur or helical gears. With the application of special equipment, this machine will check leads accurately against a master lead gage, errors being registered on a "tenth" indicator. Its simplicity makes it possible to check gears quickly without sacrificing accuracy. Its ingenious design practically eliminates the human equation and therefore the need for skilled operators.

The Red Ring Universal Gear Checker is built in three sizes, the 12" size for gears from 1/4" to 12-11/16" O.D., the 18" size for gears from 2" to 18 7/8" O.D., and the 24" size for gears from 3" to 24 7/8" O. D.

WRITE FOR DESCRIPTIVE BULLETIN

NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

5600 ST. JEAN • DETROIT 13, MICH.

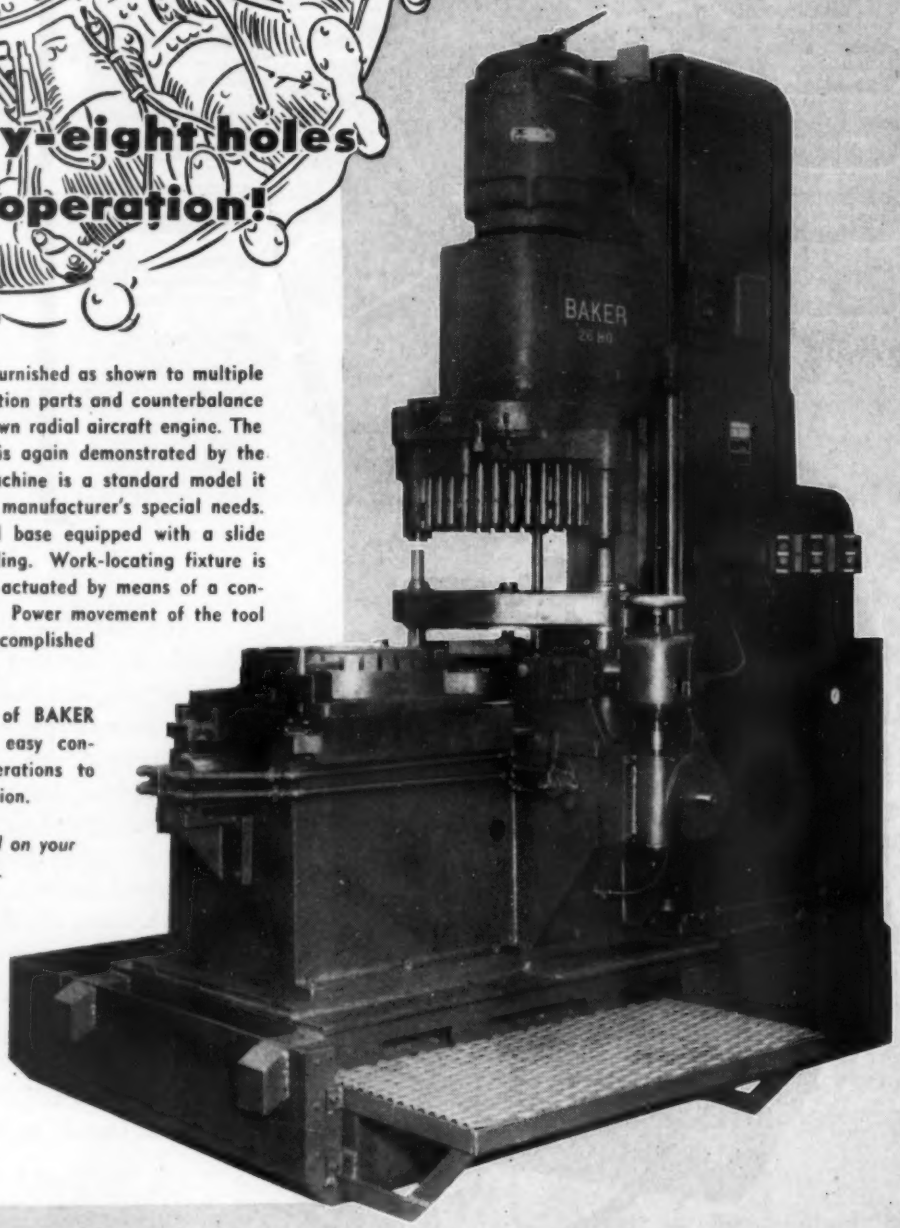
Specialists on SPUR AND HELICAL INVOLUTE GEAR PRACTICE

Originators of ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

BAKER

Model 26-HO SPEEDS PRODUCTION OF RADIAL AIRCRAFT ENGINE PARTS

Drills thirty-eight holes in a single operation!



This BAKER machine was furnished as shown to multiple drill 38 holes in cam reduction parts and counterbalance supports used on a well known radial aircraft engine. The flexibility of BAKER units is again demonstrated by the fact that although this machine is a standard model it was easily adapted to this manufacturer's special needs. Note the special extended base equipped with a slide fixture to permit easy loading. Work-locating fixture is mounted on the slide and actuated by means of a conveniently located air valve. Power movement of the tool support bushing plate is accomplished with a push button station.

Remember, the versatility of BAKER machines will mean fast, easy conversion from war-time operations to normal peace-time production.

Write for engineering aid on your special problems.

ARMY E NAVY

BAKER BROTHERS, INC. • Toledo, Ohio, U.S.A.

DRILLING • BORING • TAPPING

Our Motto Since 1867: "Machines Sturdy and Efficient, as Fine as Can Be Built..."

BAUSH
50 YEARS
OF PROGRESS

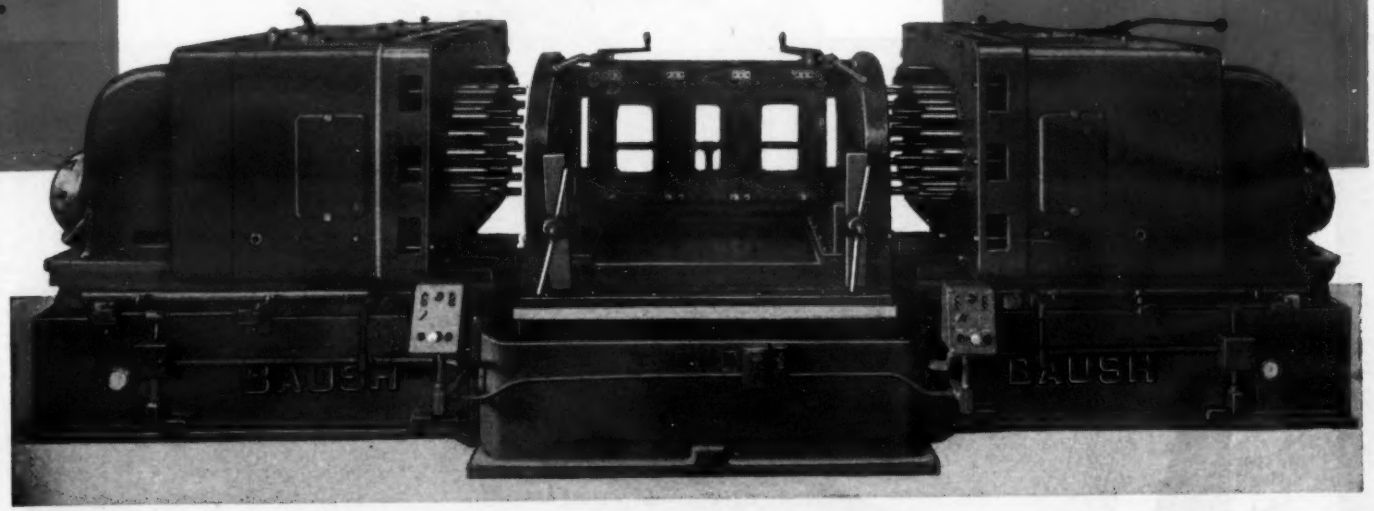
have produced Machines like this for Speeding War Production . . .

★ Baush-designed, Baush-built, this recently completed heavy duty Horizontal Multiple-Spindle Drilling Machine is especially adapted to drilling the tough metal used in tanks, army trucks, etc. With an approximate weight of 40,000 lb., ruggedness and sustained precision are assured. Extreme flexibility in drilling layouts results from such features as: hydraulic feed, adjustable drill heads, universal joints. Note spindles attached to precision-bored, double decked cluster plates. Drilling area of each head is 30"x54". Width of way is 26", and a 30-HP motor powers each head.

Fifty years ago Baush pioneered in the design and construction of multiple-spindle machinery to put such operations as drilling, boring, tapping and reaming on a high production basis. The intervening half-century of experimenting and perfecting has developed tools like this Drilling Machine; tools doing their share to help speed today's production . . . and tomorrow's Victory.

O. W. I. Photo

Rugged and speedy are today's FIGHTING machines, like the medium tank shown above . . . and only rugged and speedy PRODUCTION machines can turn them out. Baush Machines meet the test in the nation's war plants!



Baush high production machines can help YOU attain greater speed and productivity in multiple-spindle production. Write for full data.

ARMY ★ NAVY

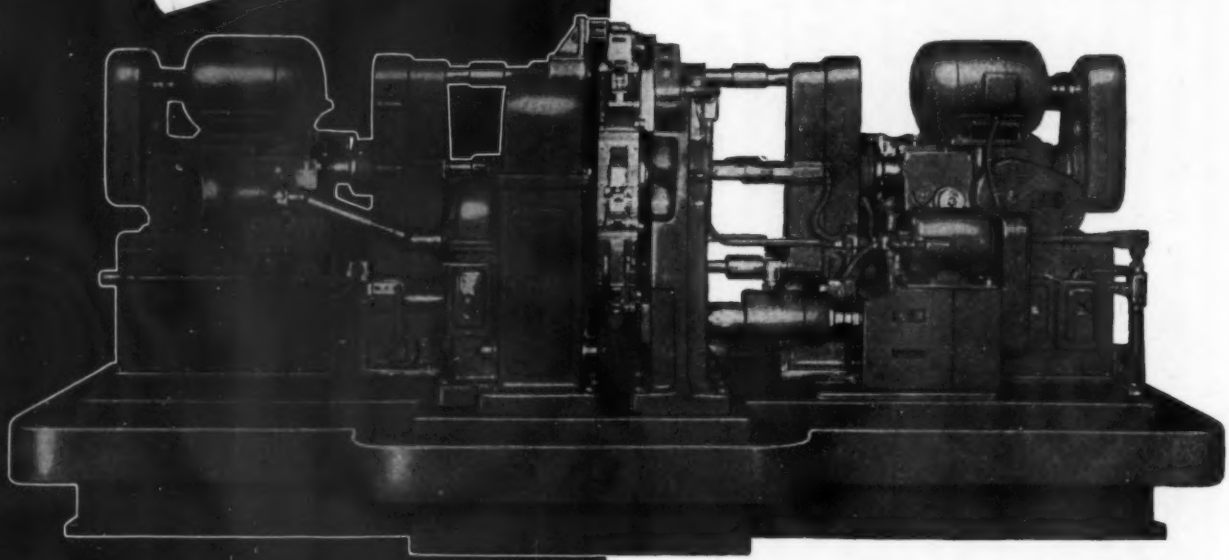
BAUSH MACHINE TOOL CO., *Springfield 7, Mass.*

Avey Automatic METHOD No. 5

THE Avey CAM FEED UNIT

No. 1 Size—1/2" capacity in cast iron.

No. 2 Size—7/8" capacity in cast iron.



Accelerated production obtainable by free loading time and automatic ejection of work. Fatigue element lessened by automatic indexing.

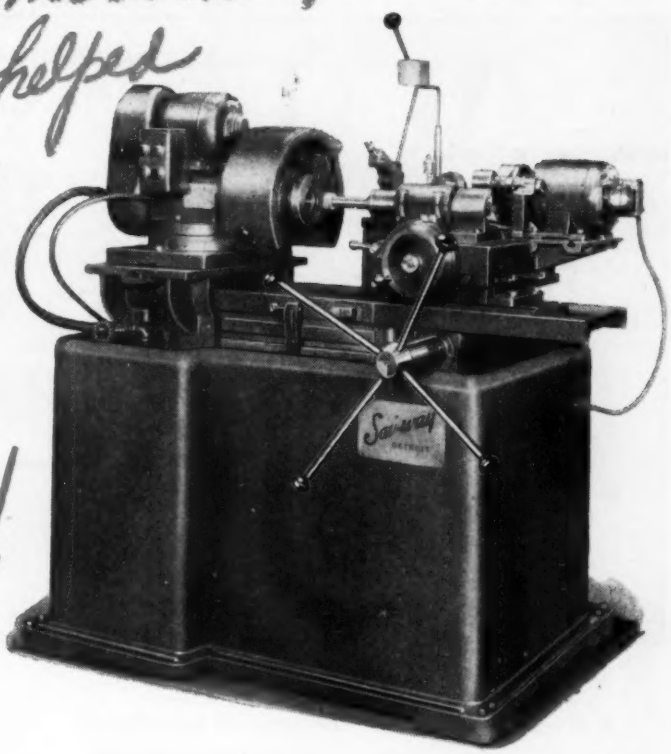
METHOD No. 5 — lower cost per part, completed double end work at one clamping — (no relocation) — greater accuracy, enabling semi-skilled operators to deliver high quality production speedily, accurately, efficiently, with a minimum of supervision.

designed for multiple operations on individual parts—(double end at one clamping of work) — facing, drilling, reaming and tapping.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.

Production America!

The machine you helped design and prove in round-the-clock punishment of war production. Available for Quick Delivery!



This Sav-Way multi-purpose internal grinder has 17 specific features—the features which you production men have asked for. Neoprene insulated against vibration, distortion, mis-alignment. Equipped with the famous Gold Seal Spindle—the spindle that breathes! Combines accuracy and stamina with the speed, flexibility, and wide range adaptability so necessary in the coming period of change-over and new product development. The coupon will bring complete description, specifications and prices.

CLIP THIS COUPON TO YOUR LETTERHEAD

Sav-Way Industries, Box 117, Harper Station, Detroit 13, Michigan

Kindly send me a copy of the illustrated folder describing the Sav-Way M-1-A Internal Grinder.

Mail to the attention of:

Mr._____

Position_____

Sav-way INDUSTRIES

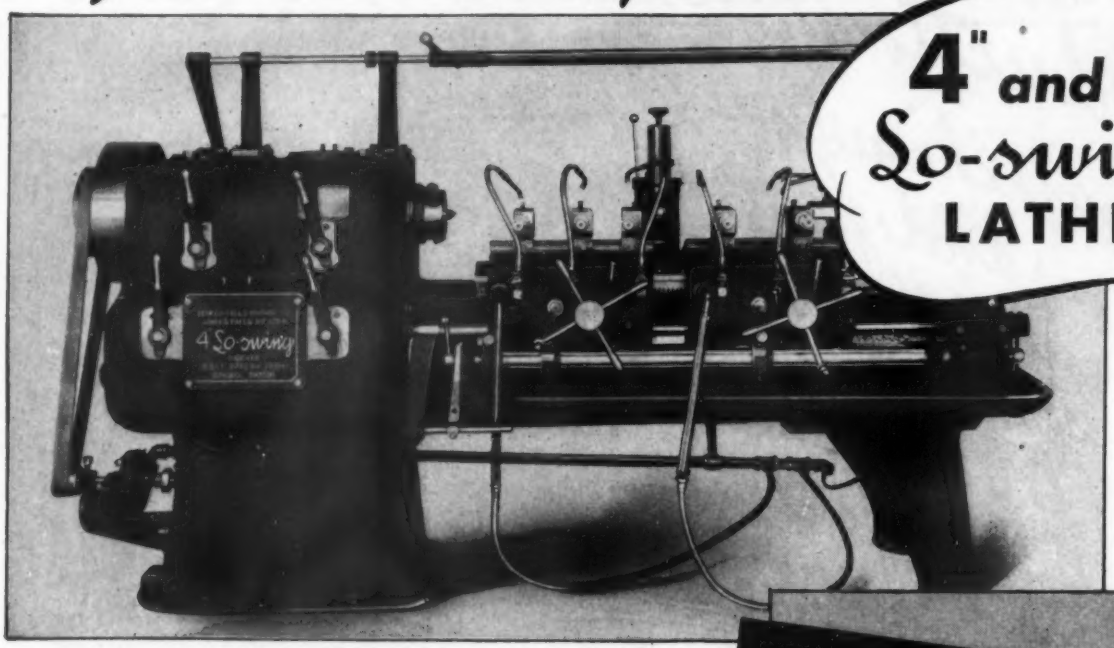
Machine Tool Division

BOX 117, HARPER STATION, DETROIT 13, MICH.

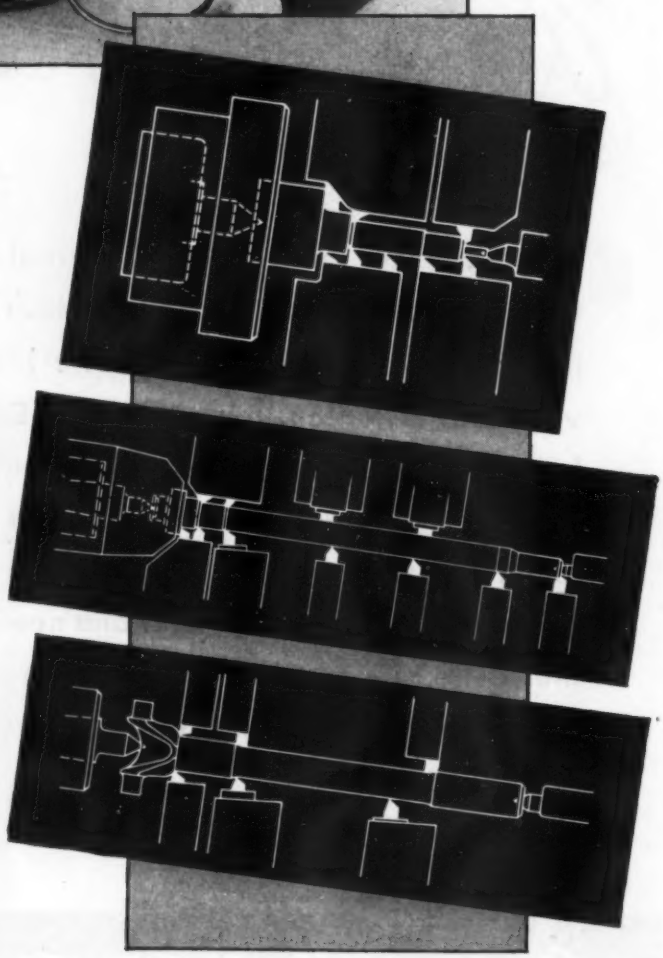
BUILDERS OF HAND AND HYDRAULIC INTERNAL GRINDERS · PRODUCERS OF GOLD SEAL SPINDLES
PLUG GAGES · MICROMETER CHECKERS · PRECISION AIRCRAFT, AUTOMOTIVE, AND ORDNANCE PARTS

A PROVEN SHAFT TURNING MACHINE

For the small plant



4" and 8" Lo-swing LATHES



● If you have shaft or similar work to turn, in small lots, this proven multiple-tool lathe will help solve your problems. It has an enviable record for accurate, low-cost production.

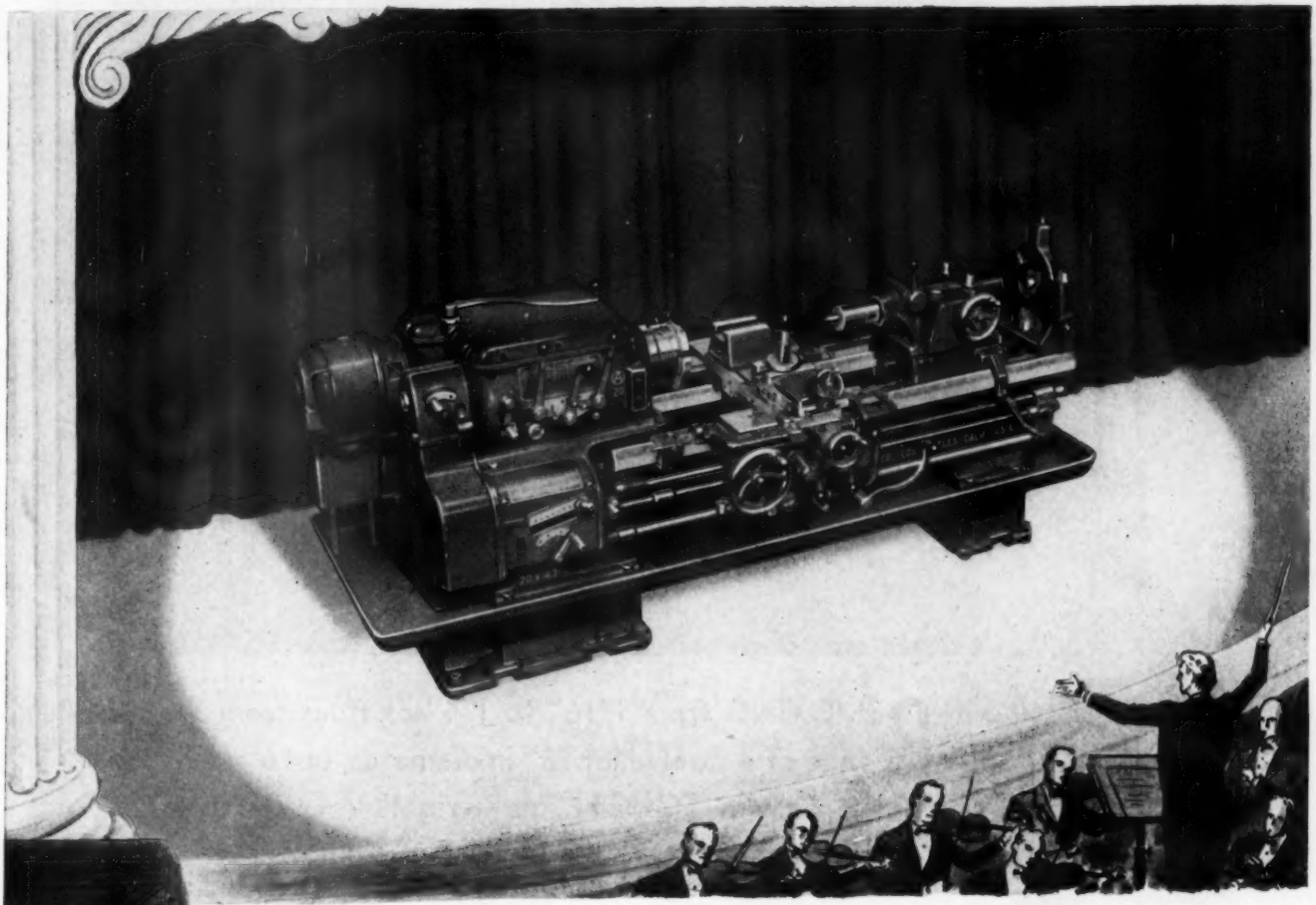
4″ & 8″ Lo-swing Lathes, in standard lengths, are particularly suited for the rapid turning of shafts up to 8-inch diameter by 132-inch length. Routine operations include turning several diameters, both straight and taper, squaring shoulders, necking for grinding and making form cuts. Power operated tools on a rear carriage are provided when necessary.

Adequate equipment for all ordinary work is available in standard accessories. For large lot production special tooling can be furnished to further increase production economies. Regardless of how complicated the tooling, the Lo-swing is quickly set up for different jobs. 4″ & 8″ Lo-swing Lathes are now available for quick delivery under Priority Regulation No. 24.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

LATHE NEWS *from* SENECA FALLS

In Today's Production Spotlight



Get "Behind the Scenes" Too

Get "behind the scenes," too, by writing for Bulletin 4401 Learn the details of Axelson Lathe construction, from foundry to finishing, under one roof

The Machine Tool "Hit"

In the center of the machine tool stage stands that perennially popular production "headliner"—the Axelson Heavy Duty Lathe . . . The brilliant spotlight of quality-seeking customer attention can find no flaw in this great machine . . . *There is none!* . . . Thirty years of prideful improvement have produced this guarantee . . . Produced a lathe which "has everything," and which stands before a critical audience conscious always of the ability to give "a great performance."

AXELSON MANUFACTURING COMPANY
6160 S. Boyle Ave., (Box 98 Vernon Station) Los Angeles 11, Calif.
50 Church St., New York City 7 • 3844 Walsh St., St. Louis 16, Mo.

Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25 and 32-inch sizes.

U.S. NAVY

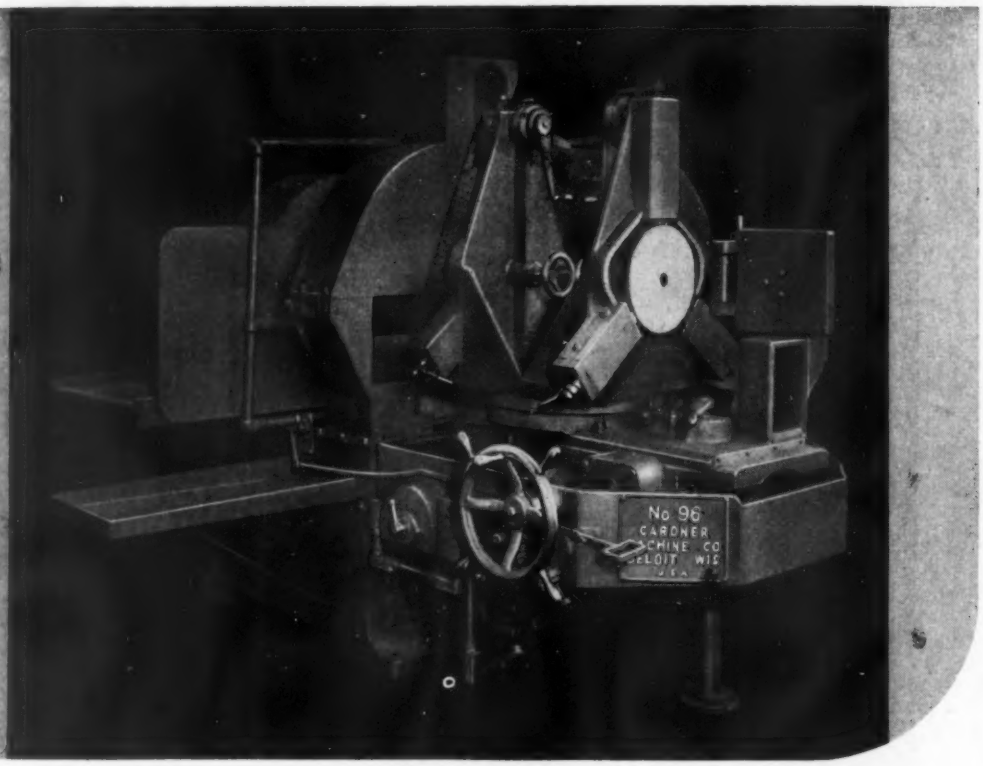
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON LATHES

Dependable for over a Quarter Century

BUY WAR BONDS

Solution to a *tough* flat surfacing problem!



GARDNER WIRE-LOKT ABRASIVES ARE *Modern* CUTTING MEMBERS

REMOVING from 1/16" to 1/4" of stock from the surface of a steel billet 13" in diameter, or 16" square—that's really a TOUGH job — right?

That's what is accomplished by the Gardner No. 96-36" Hydraulic Surface Grinder illustrated here.

The big guns of the Navy and of the Field Artillery, all require a careful checking of the analysis of the steel used in their barrels. A large section, or billet, is cut from each; it must be ground on one face, to a fine finish which meets the requirements of the analyst.

This TOUGH job is handled on this Gardner Surface Grinder at the rate of 20 pieces per hour on, say, a billet 8" square — other sizes at proportionate rates.

Check the possibilities of GARDNER-GRINDING your flat surface jobs—TOUGH or simple.

WRITE FOR OUR NEW 8-PAGE BULLETIN!

ARMY E NAVY

GARDNER MACHINE COMPANY

410 East Gardner Street · · · · Beloit, Wisconsin, U.S.A.

SEND FOR Illustrated Catalog

AND OPERATORS' MANUAL EXPLAINING NEW, DIRECT, FAST TOOL FORMING WITH MEYERS Radiform

TRADE MARK REG.

ATTACHMENT FOR FORMING RADII ON ROTARY CUTTING TOOLS ILLUSTRATING DIFFERENT VIEWS
PROCEDURE IN SETTING
For Forming a Determined Radius
FIGURE 10 . . . Illustrating the new end mill attachment for grinding accurately controlled radii on spiral fluted end mills. This attachment is furnished with adjustable cam to compensate for various helixs of the spiral flutes.
The oscillating movement on the "RADIFORM" enables a controlled rotary movement on the end mill as set by the cam.
FIGURE 12

NEW DIRECT TOOL FORMING METHOD Speeds Production!

This valuable text book contains complete step-by-step operating instructions (illustrated) for forming carbide tipped as well as high speed steel tools directly against wheel—including precision radii on spiral fluted end mills and drills. No machine shop should be without this valuable guide. Mail coupon today for free copy.

MAIL THIS COUPON TODAY

W. F. MEYERS COMPANY, INC.
1022 FOURTEENTH ST., BEDFORD, INDIANA

Send Operators' Manual explaining direct tool forming

Firm Name _____

Individual's Name _____ *Title* _____

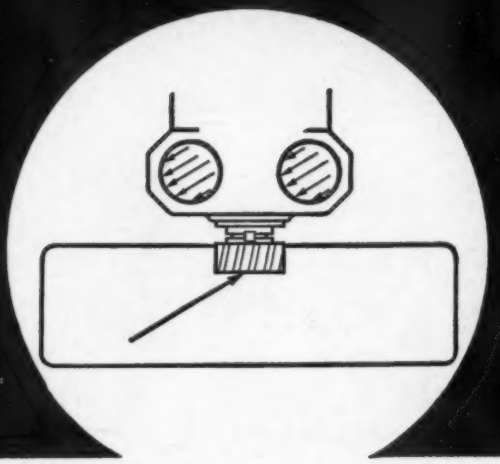
Street _____

City _____ *State* _____

W. F. MEYERS COMPANY, INC. · ESTABLISHED 1888
1022 FOURTEENTH ST., BEDFORD, INDIANA

Balanced load

BETWEEN TWO POSTS...



Kent-Owens No. 1-14 Milling Machine with improved Hydraulic Control. Table 32"x9"; table travel 14".

Twin post mounting—*exclusive* on Kent-Owens Milling Machines—assures balanced load in either direction. This means no overhang and no cocking action. The head is mounted on two cylindrical ground steel posts which carry the spindle midway between them. The result is an unusually rigid and accurate machine which is practically chatter-proof for either direction of table travel. Send for latest bulletin. Kent-Owens Machine Co., Toledo, Ohio.

THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON
General Machinery Corp.

BUFFALO
Don W. Patterson

CHICAGO
Neff, Kohlbusch & Bissell

DALLAS
Hamilton-Huster Machinery Co.

DAYTON
Gosiger Machinery Co.

DETROIT
A. C. Haberkorn Machinery Co.

GRAND RAPIDS
Joseph Monahan

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Oatis-Booth Machinery Co.

KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Eccles & Davies Machinery Company
Harron, Rickard & McCone

MILWAUKEE
Neff, Kohlbusch & Bissell

MINNEAPOLIS
The Satterlee Company

MOLINE
John J. Normoyle Co.

MONTREAL
F. F. Barber Machinery Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Harrington-Wilson-Brown Co.

PHILADELPHIA
Calco Machinery Company

PITTSBURGH
Barney Machinery Co.

ROCHESTER
E. W. Schiefer Machinery Company

SAN FRANCISCO
C. F. Bulotti Machinery Co.

SEATTLE
Star Machinery Company

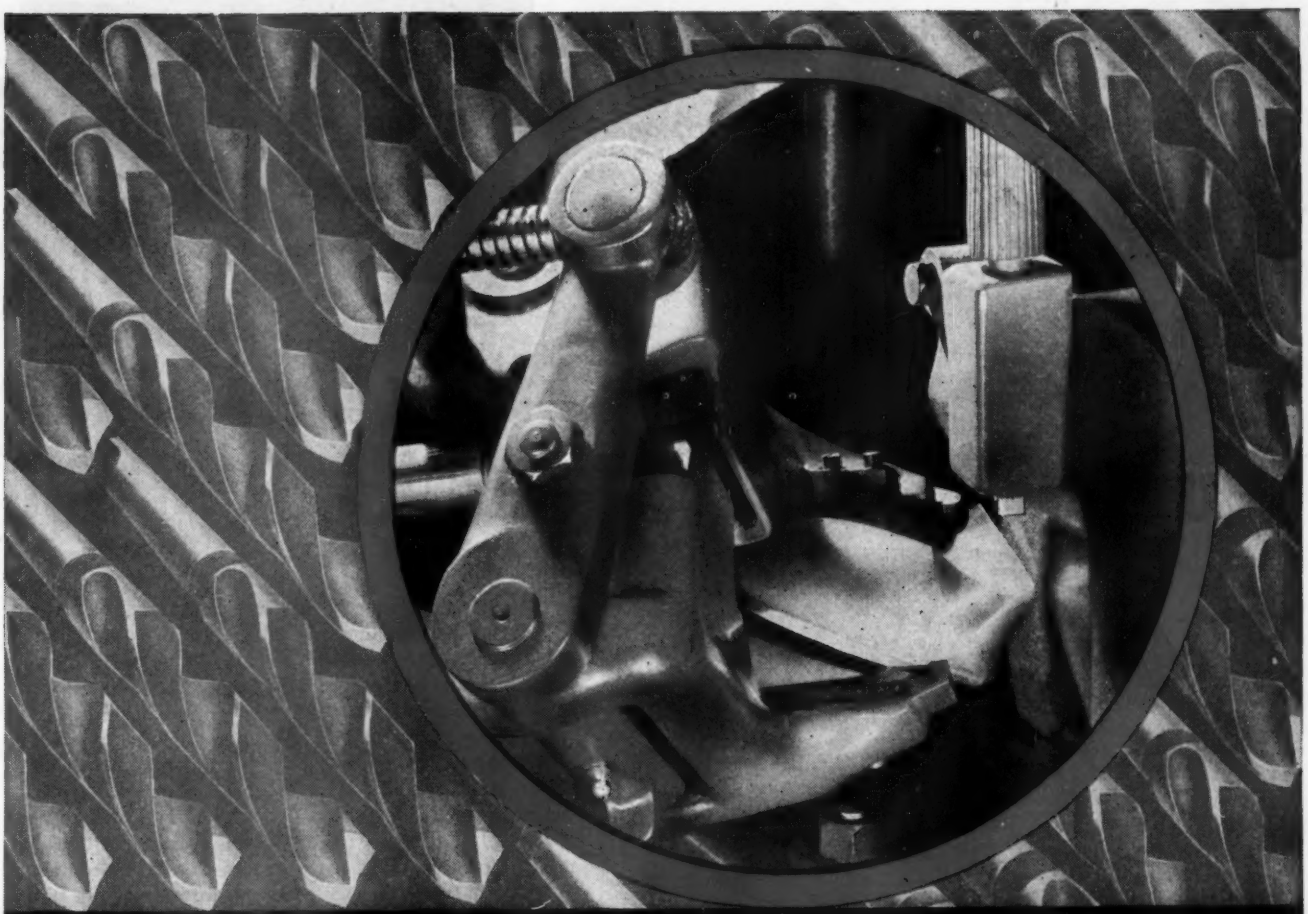
ST. LOUIS
Blackman & Nuetzel Machinery Company
Clarke Equipment Co.

SYRACUSE
J. F. Owens Machinery Co.

TORONTO
F. F. Barber Machinery Co.

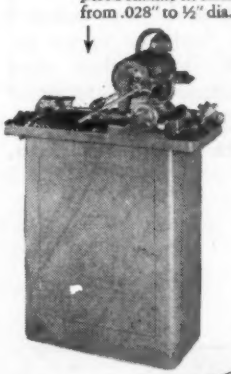
WALKERVILLE
F. F. Barber Machinery Co.

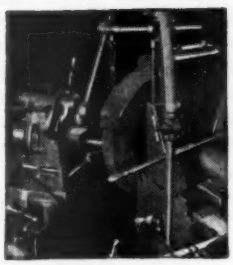
Call on KENT-OWENS for Milling Machines



The First Point and the 10,000th will be SCIENTIFICALLY CORRECT!

SELLERS NO. 1-G DRILL GRINDER with cabinet. Grinds either straight or tapered shanks in sizes from .028" to ½" dia.





SELLERS NO. 4-T TOOL GRINDER. A fully universal grinder for single point tools of every shape—from ¼" sq. to 1½" x 2".

IF fast, accurate drilling is important to your production you will find the answer in a

SELLERS DRILL GRINDER

It's more than a machine. It's a *method* of grinding which automatically produces the scientifically correct drill point required for precision work. Angles of inclination are equal, contour of lips is identical, resulting in a point which drills true cylindrical holes faster and more holes per grind. Inexperienced girls are quickly trained to turn out a continuous supply of perfect drill points—reducing both your drill inventory and drilling costs. Sellers Drill Grinders are made in 3 sizes to accommodate drills from .028" up to 3". Shipped complete, ready to plug in and go to work!

• • •

For proof of why it will pay you to equip your tool room with this modern machine, send us three drills of any size up to 3 ins. and we will return them ground with the Sellers point. No charge, no obligation.

Wm. Sellers & Company, 1610 Hamilton St., Philadelphia

SELLERS PRECISION MACHINE TOOLS SINCE 1848

HANCHETT MANUFACTURING CO.

MEMO TO: *Chief Engineer*

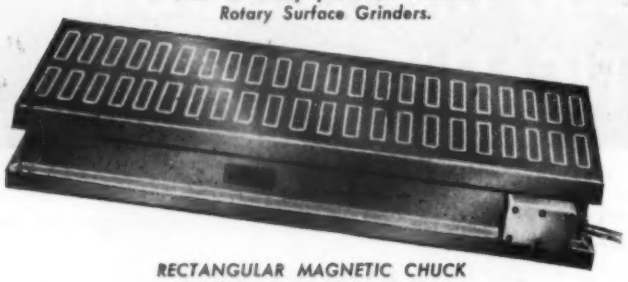
Suggest you develop waterproof, long-life magnetic chucks to meet our own exacting specifications.

Sales Dept.

-So We Had To MAKE OUR OWN!

And Now These Finer Quality Chucks are Available to You

36 in. ROTARY MAGNETIC CHUCK— Used for many years on Hanchett Rotary Surface Grinders.



RECTANGULAR MAGNETIC CHUCK —Installed on Hanchett Reciprocating Table Grinders.

Revolving MAGNETIC CHUCK—Holds knives accurately, rigidly, in any position.

The new Hanchett electro-magnetic chucks are really dependable! Triple-sealed against moisture—coils keep dry, because they're absolutely waterproof and shockproof. The patented construction technique embodies new materials and new features that have been thoroughly field-tested for a number of years, and have withstood rigorous treatment without faltering—the real test of materials and workmanship. (On February 18, 1944, a Hanchett rectangular magnetic chuck was immersed in a coolant bath with face plate off, leaving interior of the body exposed. Ever since then, the current has been turned on for seven minutes, then off for seven minutes. The chuck has been completely checked every week, and as yet has shown *no sign of breakdown!)*

Hanchett's 70 years of practical experience in grinder manufacture were combined with the skills and abilities of veteran engineers and designers to make magnetic chucks more reliable than ever before. Hanchett chucks are built in sizes and styles to meet any requirements. The most modern and completely equipped magnetic chuck department in the industry stands ready to help you. Feel free to ask for assistance on your particular problem. And write for details on the complete line, together with construction features, in bulletin 170CM-12.

Dealers—send for data.

HANCHETT GRINDERS — BIG RAPIDS MICHIGAN

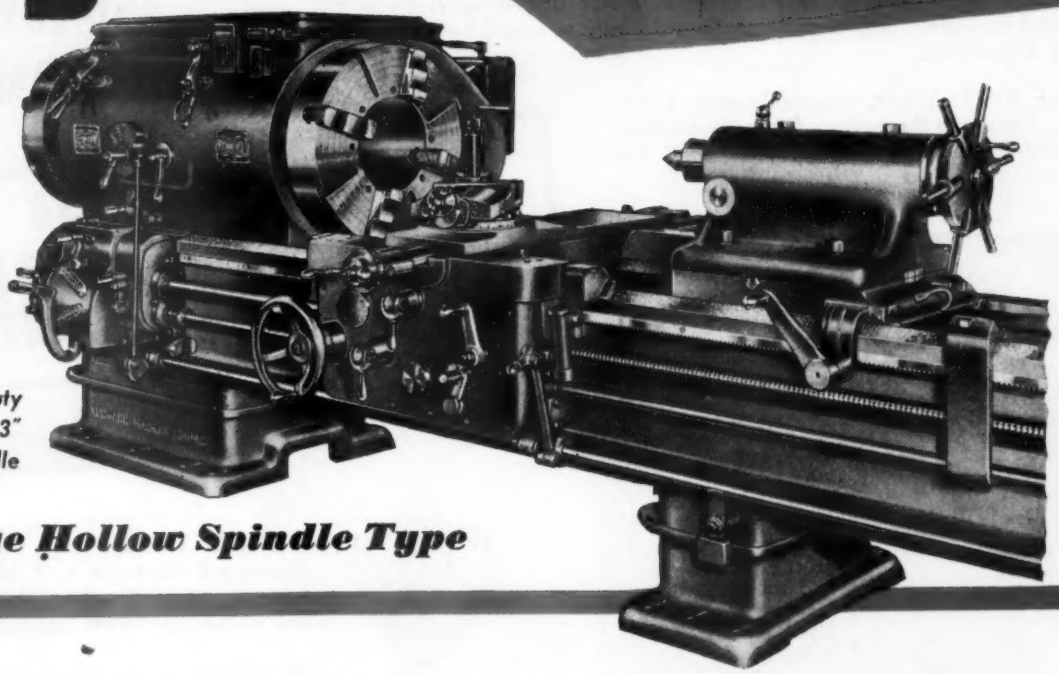
IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.

BIG RAPIDS, MICHIGAN U.S.A.

Do Important Machining Jobs in 1/2 to 1/7 the Time!

on a Hydratrol Lathe



30" Heavy Duty Lathe with 13" Hole in Spindle

Large Hollow Spindle Type

Yes, in a number of big war plants important operations are being performed in 1/2 to 1/7th the time of previous operations. In one plant, Large Hollow Spindle Type of HYDRATROL LATHES are saving 15,000 man hours per month! Why not let us show you what a HYDRATROL LATHE could do in *your* plant?

5 SIZES—18" to 36"

Small	18" up to 7¼" Hole	Large	30" up to 14" Hole
Medium . .	24" up to 12" Hole	Large	36" up to 16½" Hole
Large	27" up to 13" Hole	*(Standard Type lathes, 16" to 36")*	

7 Distinctive Features:

- ★ Easy, Fast, Simple Operation.
- ★ Hydraulic Brakes and Clutches.
- ★ Absence of Mechanical Troubles.
- ★ Automatic and Ample Lubrication.
- ★ Mechanism Protected by Automatic Control.
- ★ Extraordinary Hardness of Bed.
- ★ Available with Large Turrets for carriage which fully utilize the Great Power Capacity of these machines; and Beds on both ends of Headstock.

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND ★ ST. LOUIS 3, MISSOURI

Construction Features that Contribute to . . .

★ VERSATILITY
★ SPEED
★ ABILITY
★ ACCURACY
★ RIGIDITY
★ ACCESSIBILITY and LOW COST
★ PERFORMANCE

POSITIVE CONTROL: Multiple dry disc clutch and leather faced brake in main spindle drive gives operator positive control with flexibility to allow "inching" spindle.

16 SPINDLE FEEDS: Gears of alloy steel, heat treated, finish machined and shaved, mounted on short, ground shafts and ball bearings, provide sixteen spindle speeds, in either direction.

SMOOTH SPINDLE DRIVE: Hardened, ground, and lapped spiral-bevel gears, ball bearing mounted, make sure a smooth spindle drive.

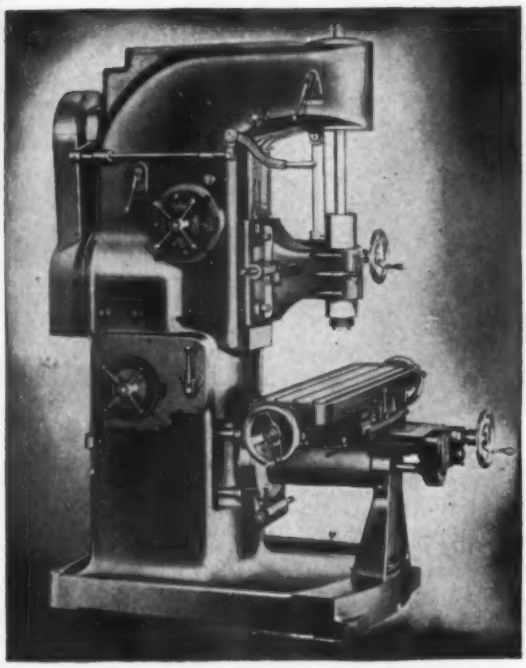
BORING RANGE: Four vertical spindle feeds for boring range from .002" to .010" per revolution.

SPINDLE HEAD SECURELY LOCKED: Positive, quick acting spindle head clamp controlled by a single lever, securely locks spindle head in any position on accurately fitted slide on face of column.

MAIN SHAFT: Single, constant speed motor drives main shaft through multiple V-belts. Compact and accessible. Motor and drive entirely enclosed for safety and cleanliness. Guard easily removed for servicing or adjustment.

TABLE UNIT: A post, accurately ground and rigidly fitted into the column, forms the bearing on which the table unit swivels around the column.

ALL-PURPOSE KNIGHT-Millers



KNIGHT *Millers are fast, compact, complete and convenient to handle. Write for our catalog that pictures and describes various jobs being done.*

TILTING TABLE: Large trunnion, on which is assembled the table unit, provides for tilting table in either direction. This feature and the one above add to the capacity of the machine.

35° TILT: The knee, actuated by large worm and gear, may be tilted 35° either side of horizontal thereby placing the table in position for angle boring or milling. Four heavy T-slot bolts solidly lock it in any position.

SAFETY FEATURE: Automatic safety throwout, built into feed mechanism, provides against over-loading and will not allow re-engaging table feeds until overload is removed.

MAINTAINING SQUARENESS: Eccentric bushing, in outer table unit support bearing, furnishes additional means of maintaining squareness between table and spindle.

POSITION OF UNIT IN DEGREES: Large worm for operating gear that tilts table unit. Graduated segment on right side of unit gives position of unit in degrees.

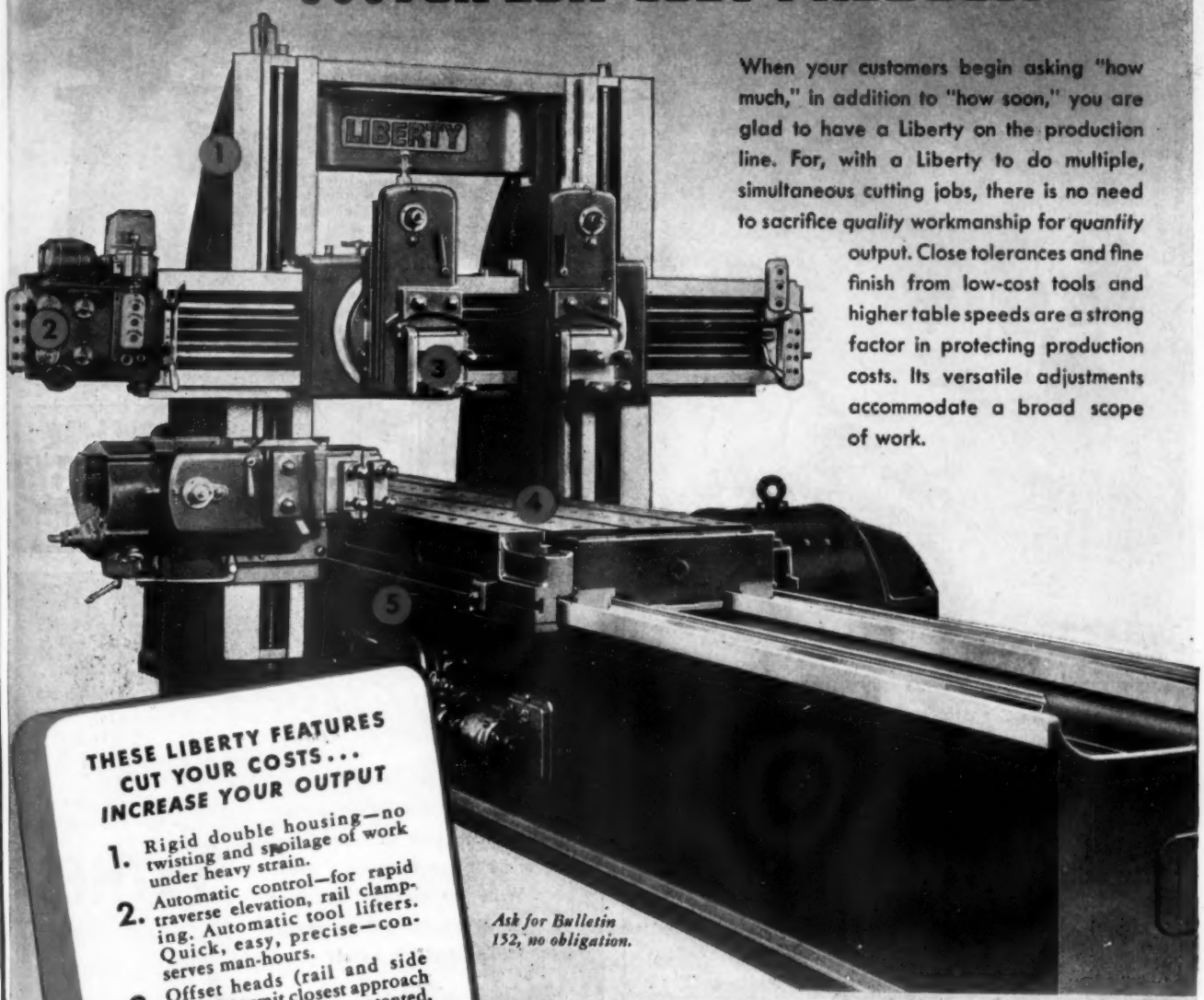
KNIGHT Millers subject to prior order for immediate delivery. Write for catalog.

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

LIBERTY

high speeds and fine finish

...FOR LOW COST PRODUCTION



When your customers begin asking "how much," in addition to "how soon," you are glad to have a Liberty on the production line. For, with a Liberty to do multiple, simultaneous cutting jobs, there is no need to sacrifice *quality* workmanship for *quantity* output. Close tolerances and fine finish from low-cost tools and higher table speeds are a strong factor in protecting production costs. Its versatile adjustments accommodate a broad scope of work.

THESE LIBERTY FEATURES CUT YOUR COSTS... INCREASE YOUR OUTPUT

1. Rigid double housing—no twisting and spoilage of work under heavy strain.
2. Automatic control—for rapid traverse elevation, rail clamping. Automatic tool lifters. Quick, easy, precise—conserves man-hours.
3. Offset heads (rail and side heads) permit closest approach of tools. Tool box has patented, tapered thrust plug, providing greater rigidity than ordinary abutments. Rail heads may be fitted with swiveling hand feed cranks for use on die work. Low original, resharpening and retooling costs.
4. Engineered for speeds up to 240 ft. per min., for modern, tipped tools.
5. Primary herringbone gear drive cut from solid steel applies power smoothly, directly, without vibration, assuring maximum production volume.

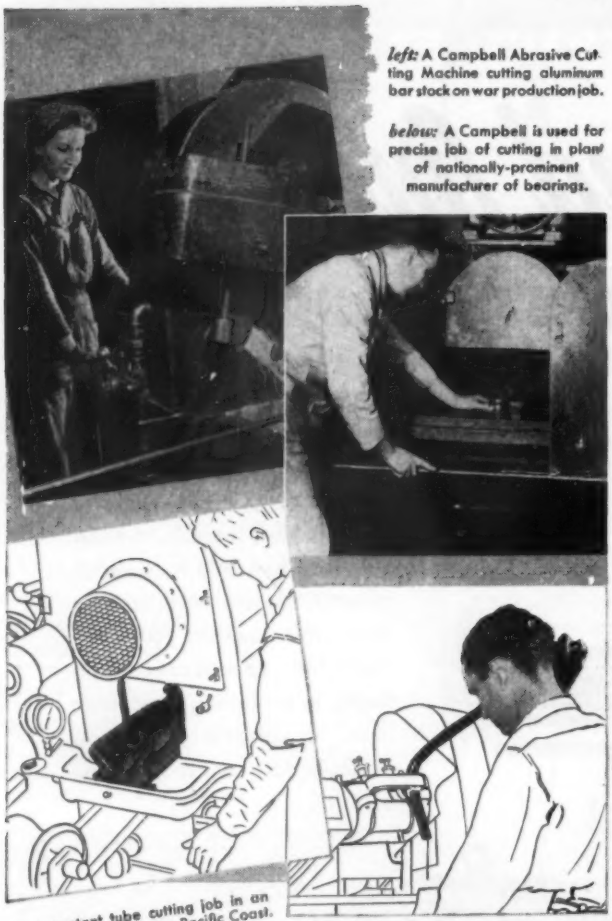
Ask for Bulletin 152, no obligation.

To assist you in getting all the benefits of modern planer science and practice, Liberty offers the helpful cooperation of its trained engineers. With a background of thorough experience with all types of machine tool equipment and operations, Liberty Engineers can help you get greater production faster, more accurately, automatically—at lower cost.

LIBERTY PLANERS

HAMILTON, OHIO • U. S. A.

Over a Quarter Century of Specialized Experience with Time-Tested Principles of Design



left: A Campbell Abrasive Cutting Machine cutting aluminum bar stock on war production job.

below: A Campbell is used for precise job of cutting in plant of nationally-prominent manufacturer of bearings.

An important tube cutting job in an aircraft factory on the Pacific Coast.

Precision set-up on a manually-operated Campbell in a war production plant

WHAT IS *YOUR* CUTTING JOB?

These 4 **CAMPBELL ABRASIVE CUTTING MACHINES** are all different. Each is cutting different stock to different dimensions—none limited to the job it is doing

CAMPBELL has the only complete range of Abrasive Cutting Machines—cutting annealed and unannealed steels, non-ferrous alloys, plastics, glass and ceramics —solid bar, tubular and flat stock.

What are you cutting? **CAMPBELL** can give you a procedure that will do the work better, make it easier to meet schedules and lower costs.

Get further information by writing the Andrew C. Campbell Division. State what material you are cutting, length of pieces before cutting, length of cut-off pieces and production required per hour.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION

BRIDGEPORT • CONNECTICUT

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!

Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

Complete Information Will Be Sent You Upon Request — Write!

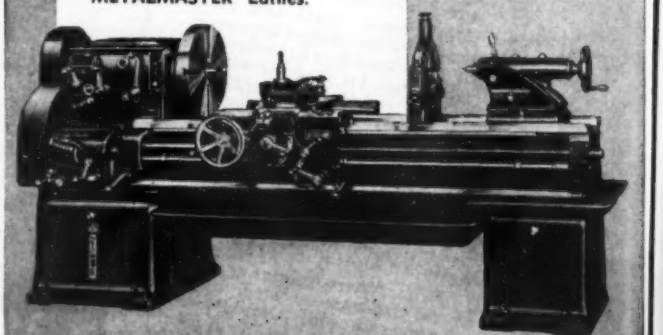
BURKE MACHINE TOOL CO.

CONNEAUT • • • OHIO

Metalmaster

• Fast, accurate for war production . . . durably constructed, precision built to meet peacetime manufacturing needs. Write for catalogs describing in detail the advantages of METALMASTER Lathes.

12", 14" & 16" LATHES



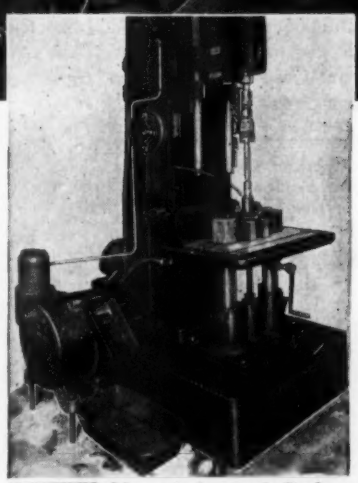
The **BRADFORD MACHINE TOOL Co**

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT, HYDRAULIC DRILLING MACHINES . . . IN BUSINESS SINCE 1840

659 EVANS AVE. . . . CINCINNATI, OHIO

Announcing!... THE NEW BARNESDRIL *Magnetic-Automatic* COOLANT SEPARATOR

(Above) Magnetic-Automatic Coolant Separator attached to cylindrical grinder. Upper chute scrapes off swarf and deposits it in removable pan. Lower spout shows clean coolant returning to reservoir.



BARNESDRIL *Magnetic-Automatic Coolant Separator on Vertical Honing Machine.*

New low cost method for automatically removing harmful metal particles from honing and grinding coolants . . .

It is no longer necessary to have costly filtering equipment to remove magnetic material from honing and grinding coolants. The new BARNESDRIL Magnetic Coolant Separator removes foreign matter automatically on a rotating magnetic drum. It can be started, stopped, or run continuously. Being entirely automatic, maintenance is reduced to a minimum. Because of this the honing or grinding machine operator can devote his entire time to productive work for there are no filters to clean, change or look after. Swarf that accumulates on the magnetic drum is automatically removed as the drum rotates. A chute carries it to a removable container, while a spout carries the clean coolant to the machine reservoir for recycling.

The Magnetic Separator is easy to install and can be used on any type honing machine or on some types of cylindrical grinders. There is no temperature rise of coolant flowing through Separator.

By removing magnetic metal chips and coarse abrasive particles from the coolant, there is little danger of marring or scratching finished work. As a result, finished workpieces are not rejected.

Complete Information on Magnetic-Automatic Coolant Separator is available in New Bulletin No. A-151. BARNESDRIL Engineers will gladly recommend the unit for your needs.

Barnes Drill Co. 830 CHESTNUT STREET ROCKFORD ILLINOIS, U.S.A.

One manufacturer didn't think his cutting oil costs mounted to enough to bother about. Then he looked up his bills for the past year. He got a real surprise. Four barrels of cutting oil used per week @ $27.50 a barrel . . . $110 a week, $5,720 a year for cutting oil.

Right then that manufacturer installed an American Chip Wringer. Now, instead of 4 barrels of cutting oil a week, he uses only 2. A saving of $2,860 a year . . . more than enough to pay for the Chip Wringer twice over.

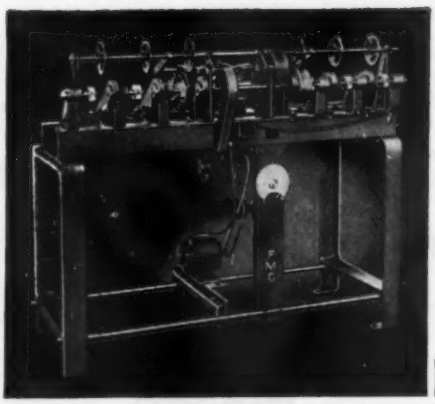
Check your cutting oil bills for any period. Then divide the total in half. That's how much an American Chip Wringer can save you. Write today for complete information.

American Chip Wringers are available in 5 different models. Write today for illustrated catalogs.

ARMY E NAVY
CINCINNATI PLANT

In only 3 minutes, an American Chip Wringer reclaims more than 90% of the cutting oil from a load of metal chips or machine turnings. It can be operated by any unskilled person.

The AMERICAN LAUNDRY MACHINERY COMPANY
CINCINNATI 12, OHIO



FIDELITY

Screw-Type Wire Spooling Machine . . .

For low wire speed . . . and fine wire from .002" to .010" diameter. Spools loaded or taken off while machine is in operation. The machine illustrated, six individual spooling heads and adjustable traverse, is equipped with speed reducer and variable speed drive to vary wire speeds from 40 to 120 feet per minute.

Other FIDELITY Machines for winding plastic tapes, surgical threads, fine filament wires, etc., frequently combine additional functions like inserting the wound package into a container.

ARMY E NAVY

BUY BONDS to bring the boys down the Home Stretch

33 YEARS' EXPERIENCE

Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY
3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

LEACH External Grinder

PRICE
$875.00
Fully Equipped

Our dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

Grinds Work from 3/4" to 11" in length and from 1/8" to 7" in diameter.

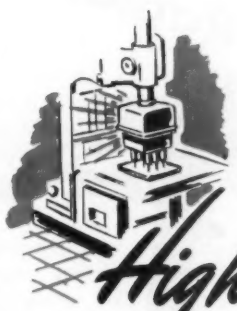
Send for Descriptive Literature

EXCELLENT DELIVERIES

Exclusive Selling Agents
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE, R. I.
Agents in all Principal Cities Throughout the World

THRIFTMASTER

Your parts blueprints will bring recommendations and quotations. Literature on request.



High Production - Money Making

MULTIPLE SPINDLE DRILLHEADS

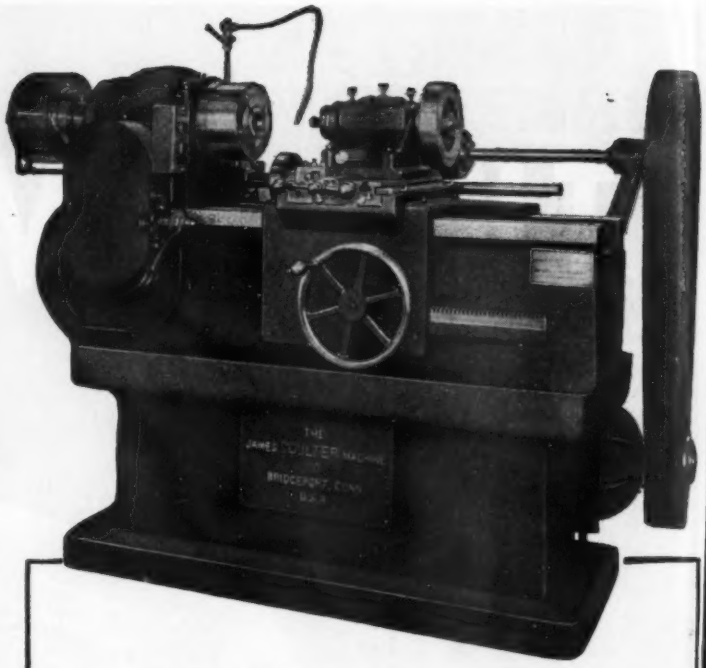
THRIFTMASTER PRODUCTS

DIVISION OF

ZIMMER-THOMSON CORPORATION

29-05 Review Avenue · Long Island City 1 · New York

Keep Ahead of
DEFENSE DEMANDS
on the PRODUCTION of
EXTERNAL and INTERNAL THREADS



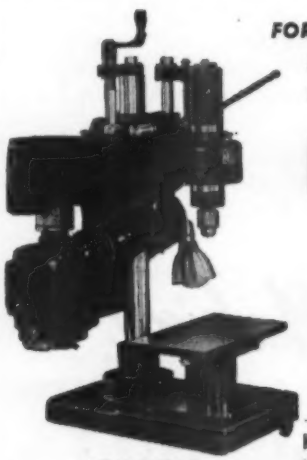
The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James COULTER *Machine Co.*
BRIDGEPORT • CONNECTICUT • U.S.A.



FOR GREATER SPEED RANGE, SENSITIVITY AND EASE OF OPERATION . . .

HAMILTON
"VARIMATIC"

. . . SUPER SENSITIVE, VARIABLE SPEED DRILLING MACHINES!

★

LOW RANGE
Min. Spindle Speed 840 — Max. Spindle Speed 2700

HIGH RANGE
2900 — 9300

DRILL CAPACITY
.004" to 5/16"

Here's a unit built with "instrument precision", fully capable of handling the finest work for both defense and peacetime production. Combining sensitivity and ease of operation, the "VARIMATIC" allows instantaneous, variable speed adjustment in two ranges. (Speed changes are accomplished by means of a hand wheel. A graduated dial on hand wheel shows the speed at which the spindle is operating.) A letter will bring complete details—write!

The Hamilton Tool Co.
830 NINTH ST. HAMILTON, OHIO

Grand Rapids
DRILL AND TAP GRINDERS
Model 10-B

Other Combinations Also Available

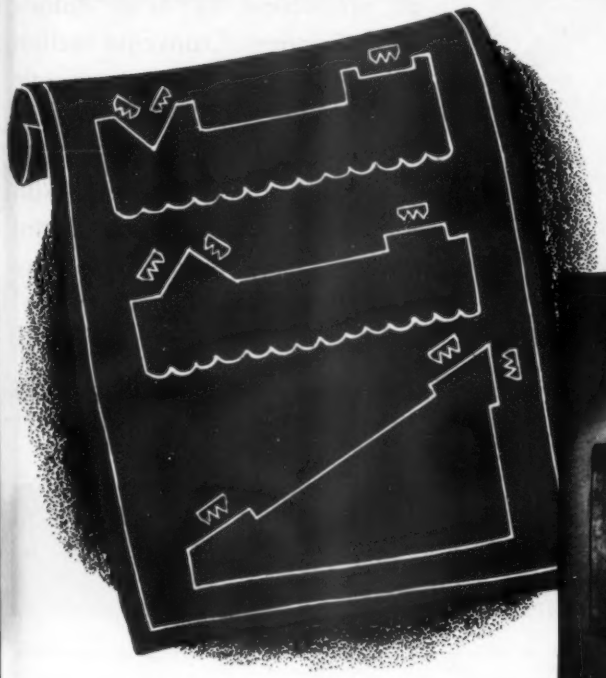
Sharpens Taps, 2, 3 and 4 Flute, Right or Left Hand. Sizes No. 6 to one and one half inches.

Sharpens Drills, 2 and 3 Flute, Straight or Taper Shank. Sizes from one eighth to one and one half inches.

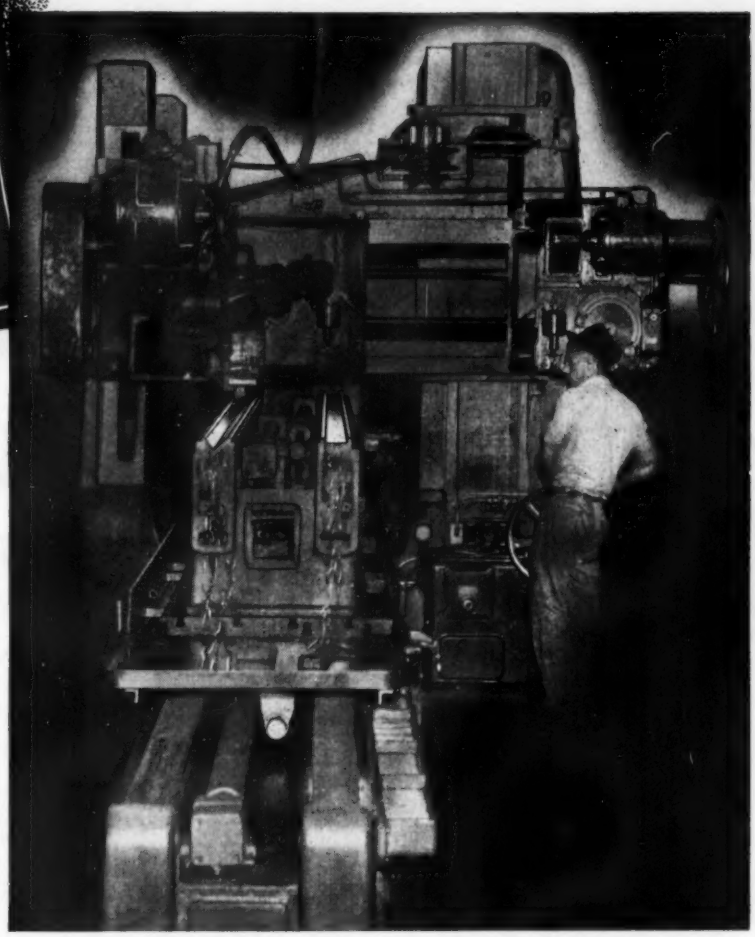
GALLMEYER & LIVINGSTON CO.
330 Straight Ave. S.W.
GRAND RAPIDS (4) MICH.

GRINDING

VEES, ANGLES, FLAT WAYS AND SURFACES



- **Steps-up Production . . .**
- **Assures Precision Finishing**



Production costs go down and output increases greatly, when these surfaces are finished by *grinding*. The Hanchett Plano Grinder replaces conventional methods of machining and hand scraping, with important advances in precision and accuracy. And on hardened ways and surfaces, grinding is the *only* way to meet the extremely narrow limits set up for precision finishing.

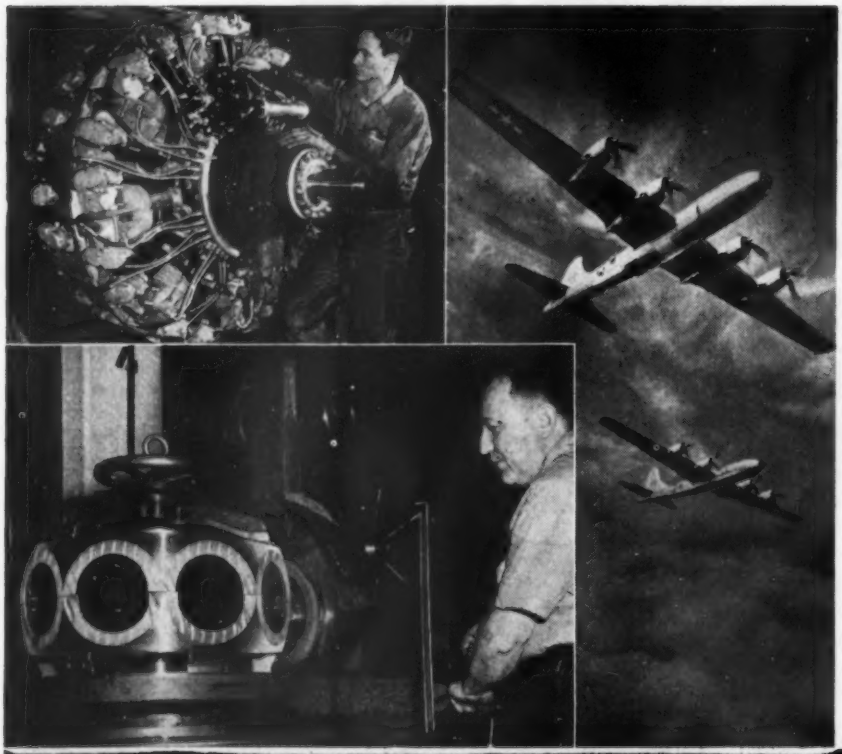
Hanchett Plano Grinders are available with either horizontal or vertical spindles. The horizontal spindle type with straight wheel (illustrated) is particularly designed for the grinding of V-ways, angles and flat ways — on lathe beds, slides, columns, carriages, tables and similar parts — all of which must be precise for their entire length. Table sizes: 30" and 50" wide, and 72" to 220" long. Send for complete details today, in bulletin 170-GA-12

Example: Large base, weighing 4450 lb., 149" long; one flat way 2⅜" wide, and one Vee-way, 1¾" x 1¾".

HANCHETT GRINDERS — BIG RAPIDS MICHIGAN

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.



THE NEW MARVEL OF THE SKIES —BOEING-29 SUPERFORTRESS

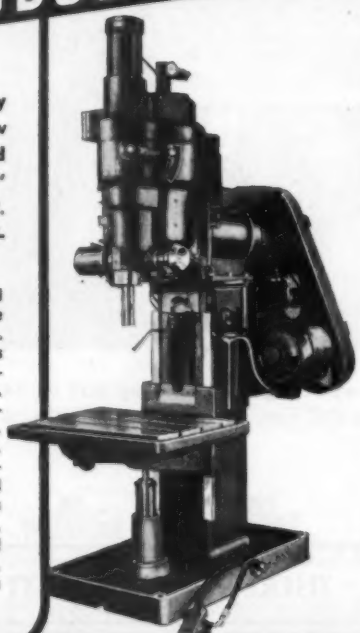
Each Superfortress employs four Wright 2200 h.p. engines; and the spherical form on the outside of crankcase is successfully ground in high production by Arter Rotary Surface Grinders. Crankcase section is centered accurately on magnetic chuck adjusted to hold the center of the spherical surface exactly in line with center of grinding wheel. With rotation of crankcase, in horizontal plane, its edge is intersected by edge of cup-shaped grinding wheel rotating in vertical plane.

ARTER ROTARY GRINDING MACHINES ARE VERSATILE GRINDERS

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

FOR CONTINUOUS HIGH DUTY PRODUCTION . . .



Kaufman #10A Hi-Duty single spindle. Lead Screw Tapper made in 3 HP and 1½ HP models, with ¾" N.C. and 1½" N. C. Threads in alloy steel offers these features:

FULLY enclosed . . . . lead screw and nut operate constantly in oil bath . . . positively wear-proof clutches instantly engaged and controlled by air cylinder . . . quick traverse when not actually cutting threads . . . accurate depth control . . . control to protect tap overload, and further protected against jamming if work is placed in upside down . . . class 3 fits always assured and perfectly controllable. Complete information upon request.

KAUFMAN MFG. CO.

MANITOWOC, WISCONSIN

"BUZZER" HIGH SPEED *Gas* FURNACES

Attain High Temperatures

without BLOWER or POWER . . . just connect to gas supply

FULL MUFFLE FURNACES . . . reach temperatures of 2400° F. without blower or power. Ideal for heat treating high speed and Alloy Steels. Also available in Bench Models.

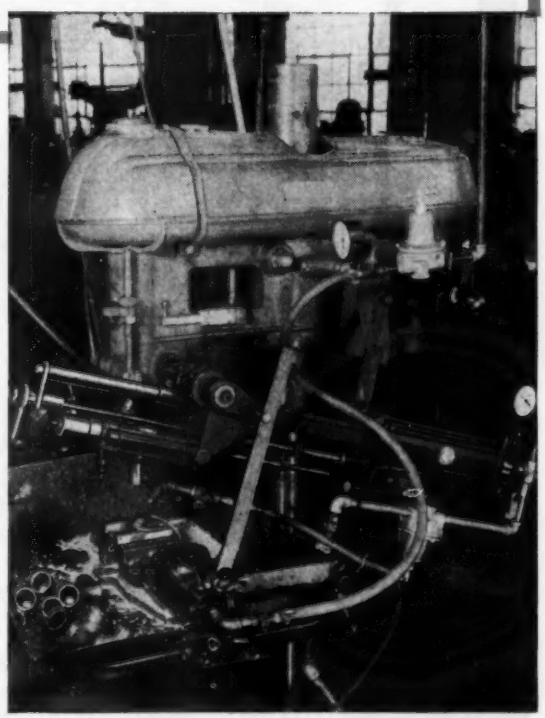
ATMOSPHERIC POT HARDENING FURNACES . . . tangentially-fired to assure even heat up to 1650° F. are used for Salt, Cyanide and Lead Hardening. Also adapted for Melting Aluminum.

Send for the complete "BUZZER" Catalog

CHARLES A. HONES, INC.

121 So. Grand Ave. Baldwin, L. I., N. Y.

How to make a hand-operated drill press an automatic production unit in 10 minutes!



A BELLOWS Controlled Air-Power Drill Press Feed, synchronized with a Bellows Controlled-Air Vise, brings automatic operation to standard drill presses in a matter of minutes.

The Bellows Drill Press Feed, at the touch of a handle, advances the tool through the work at a precise and exactly controlled rate — and automatically returns the tool to starting position. Ample cushioned power, perfectly controlled, eliminates tool shock — means longer tool life, more accurate tolerances.

A Bellows Air Vise, or a custom made fixture operated by a Bellows Air Motor, may be synchronized to open and close automatically with the movement of the spindle. The exhaust air may even be used to eject the part! All the operator has to do: insert the work, push the handle.

Not only is production increased by the automatic action, but the reduction in operator physical effort means less fatigue, less accident hazard, more uniform quantity and quality of production.

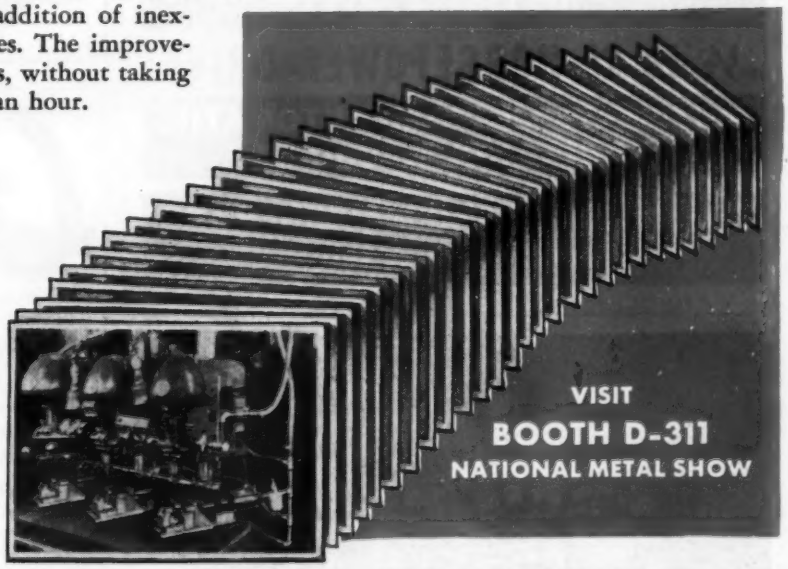
Bellows Controlled Air-Power Devices: Air Motors, Air Feeds, Air Vises — are doing hundreds of jobs automatically that were formerly done by hand. You, too, can quickly convert hand operated drill presses, millers, grinders, and other machine tools to automatic production units by the addition of inexpensive Bellows Controlled Air-Power Devices. The improvement can be made by your own tool engineers, without taking equipment out of production for more than an hour.

SEND FOR THIS

New-Free

PHOTO-FACTS FILE

Twenty-five 8"x10" photographs showing interesting applications of Bellows Controlled Air-Power Devices in leading plants all over America — together with a record of production accomplishments, installation costs. Send for your free copy, today!



The Bellows Co.

ESTABLISHED 1911

AKRON 10, OHIO

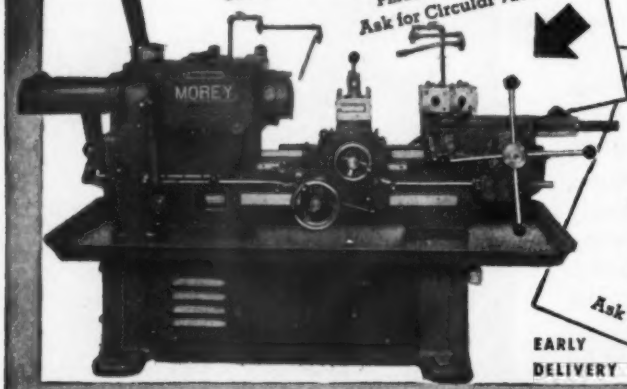
MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL
For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

2 PLAIN-GEARED
For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL
For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



- INFINITE SPINDLE SPEEDS —Electronically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS *MODERN* TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

MILLHOLLAND

Automatic DRILLING - BORING MILLING - TAPPING Units

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

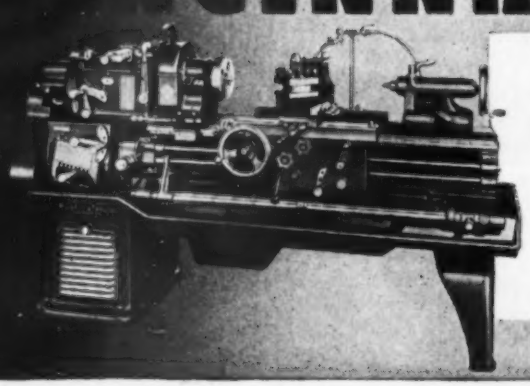
CLEVELAND
OHIO, U. S. A.

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

Giant KEYSEATERS

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

CINCINNATI LATHES



Inherently accurate on every job

In every detail of design and construction, accuracy of these modern, convenient lathes assures precision performance. For example: gears are cut to closest tolerance, hardend and ground; spindle is mounted on roller bearings taking thrust in both directions; ways and carriage are hand scraped to closest precision. A massive bed construction provides strength and stiffness which contribute to overall accuracy on heavy cuts. Sizes from 14" to 30". Supplied with proper equipment for machining different size Shells.

THE CINCINNATI LATHE & TOOL CO.
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

SPEED + PRECISION ECONOMY

. . . PLUS HYDRAULIC VERSATILITY FOR QUICK CHANGE-OVER TO NEW PRODUCTS

Fully automatic with hydraulic holding equipment, feeds, tailstock quill. Swing over bed 15", over carriage 8", between centers 30".

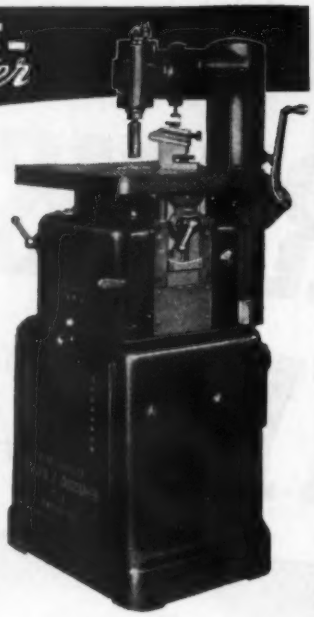
Designed especially for carbide tools, the Lipe Carbo-Matic Lathe gives you full advantage of modern "man-made diamond" cutting tools. It has the rigidity and brute power for fast, heavy hogging or intermittent cuts on high brinell steels . . . the high spindle speeds for efficient precision finishing to tolerances as close as .0005" . . . and the automatic "know how" which carries a cycle to completion without help from the operator. Labor costs, tool costs and scrap costs are lower. Adjustment, cleaning and re-setting are simpler.

It has the versatility for quick change-over to new products or parts. Feed rates, traverse rates and sequence of motions are hydraulically controlled, permitting almost infinite variation. Speed changes range through 198 different steps from a low of 59 to a high of 3,100. It is a lathe you can rely on . . . a lathe that will give you the very qualities you'll need most in a post-war world of change, obsolescence and new products.

ARMY E NAVY

LIPE-ROLLWAY CORPORATION
SYRACUSE 1, N. Y.

YOU CAN DO IT—
Faster..Better



With
BOYAR-SCHULTZ
No. 2
Profile Grinder

For fast, accurate, economical grinding irregular profiles, odd and difficult shapes encountered in tool and die work and experimental and development activities.

Both independently powered spindles operate at 10,000 R. P. M. affording rapid stock removal, even with wheels of small diameter. Vertical oscillations reduce wheel wear.

Saves time on many operations that would otherwise require hand work or costly "set-up" time on machines of other types. Made in two models, Dual Spindle as shown, or with Single Spindle. Many users have discovered the value of this machine tool in production grinding as well as in tool and Die work.

WRITE FOR CIRCULAR

BOYAR - SCHULTZ CORPORATION
2109 Walnut Street CHICAGO 12, ILLINOIS

ABRASIVE
ACCURACY BOOSTS PRODUCTION

No. 1G INTERNAL GRINDER
No. 34 VERTICAL SPINDLE SURFACE GRINDER
No. 1½ HAND FEED SURFACE GRINDER
No. 3B AUTOMATIC FEED SURFACE GRINDER

Look for Our Full Page Advertisements

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND

LEADING THE INDUSTRY IN CARBIDE TOOLS SINCE 1930
Vascoloy RAMET
TANTUNG CUTTING TOOLS — DIES
VASCOLOY RAMET CORP. • NORTH CHICAGO, ILLINOIS

DAVIS KEYSEATER
This low cost machine will handle internal keyseating jobs up to 1¼ in.
Write for illustrated bulletin.
DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

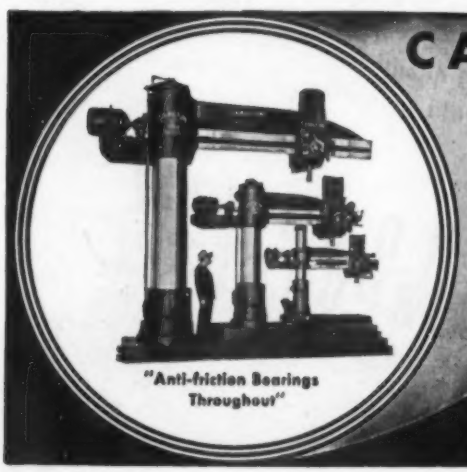
PRECISION MACHINE VISES

All Perkins Swivel Vises swing 360 degrees and have complete circle graduations. All Angle Vises raise 92 degrees.
Write for Bulletin No. 110
MACHINE TABLE
SWIVEL ANGLE
ANGLE
SWIVEL
ANGLE

MILLER-KNUTH MFG. CO. OMAHA, NEB.

WAR BONDS
are
WAR WEAPONS
★ ★ ★ ★
Invest to the limit!

CARLTON RADIAL DRILL



FEATURES— 1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

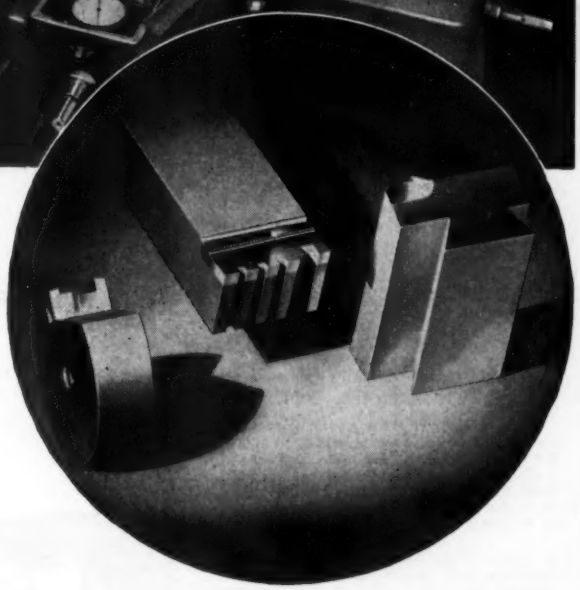
The CARLTON
MACHINE TOOL COMPANY
CINCINNATI, OHIO, U. S. A.

ARMY E NAVY

THESE Wickman PRINCIPLES

LAYOUT 50 TIMES THE SIZE OF PROFILE TO BE GROUND
50 TO 1 PANTOGRAPH
30 POWER MICROSCOPE
CROSS HAIRS OF MICROSCOPE FOCUS ON WORK AND GRINDING WHEEL. INTERSECTION OF CROSS HAIRS CORRESPOND TO THE POSITION OF THE POINTER ON 50 TIMES SIZE LAYOUT.

Make Possible The ACCURATE GRINDING Of Profiles Such As These In Tungsten-Carbide Or Other Hard Metals



● The Wickman Profile Grinder has for a number of years proved exceptionally efficient for the grinding of irregular shaped contours on flat or circular form tools, male and female profile gages, punches, open and sectional die segments, etc.

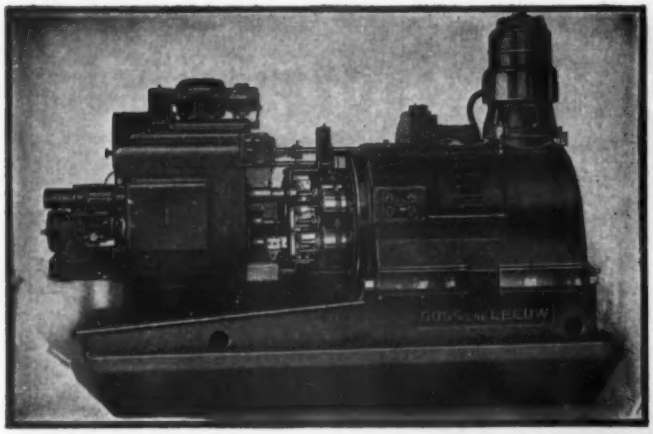
● Accuracy is held to within ± .0005". This accuracy is not affected by wheel wear and no special shapes or radius dresser need be used.

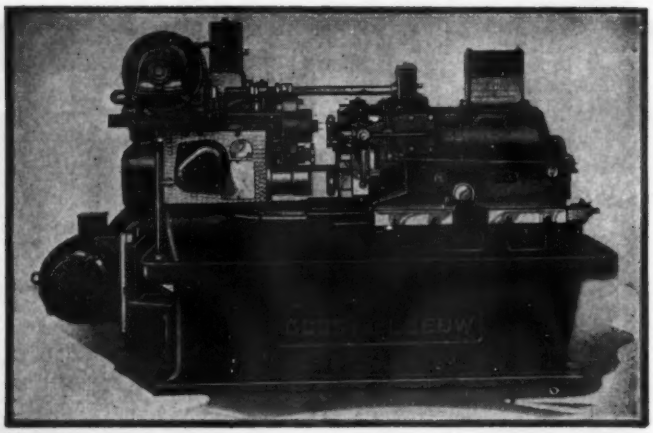
● Finished parts can be checked against the layout without removal from the machine. Reversing the operations followed in grinding, layouts can be made of parts having previously undetermined profiles.

Literature Containing Full Information Is Yours for the Asking

THE Wickman CORPORATION

15539 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

WIDE, INSTANTLY AVAILABLE SPEED RANGE *assures versatility for* TYPE 50 REED SENSITIVE DRILLS

Greater safety, speed, convenience and simplicity are offered in these streamlined REED Sensitive Drills which are now available with any number of spindles.

An infinite speed range from 440 to 3000 R.P.M. is instantly available and controlled by a conveniently located special hand wheel above spindle. An indicator is at eye level and shows spindle speeds at all times.

A Reeves Type Variable Speed drive is provided with motor for each spindle. Spindles are fully mounted on precision ball bearings.

Specifications

Capacity ¾"—Morse Taper No. 2
Spindle Travel—6"
Spindle Diameter—⅞"
Spindle to Column—8¼"
Motor ¾ HP Ball Bearing
Table—(single spindle) 15⅜" x 16"

Write for illustrated folder giving complete details.

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.

PORTAGE

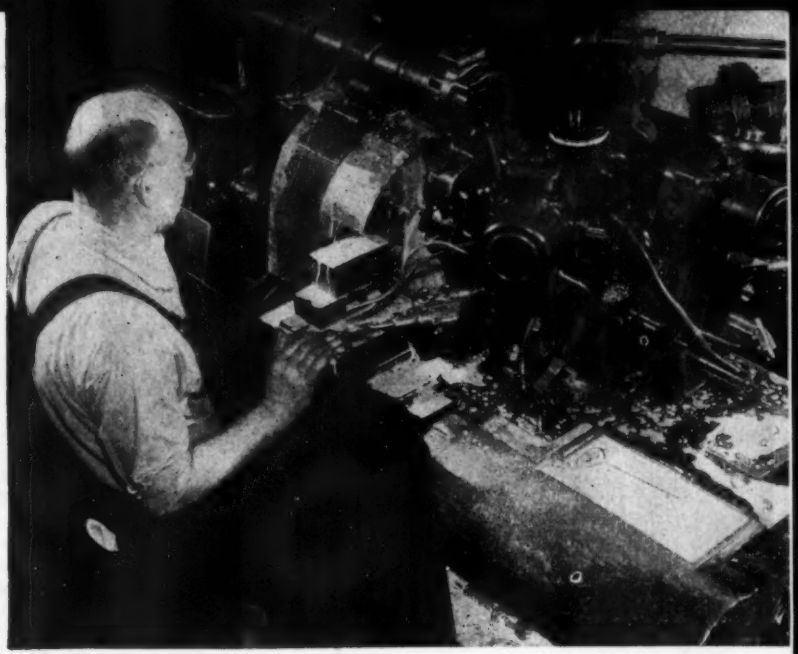
HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy* of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

FOSTER

4 SPEEDS... 10 FEEDS *Automatically Changed* to Perform 23 Operations *on this Aircraft Part*



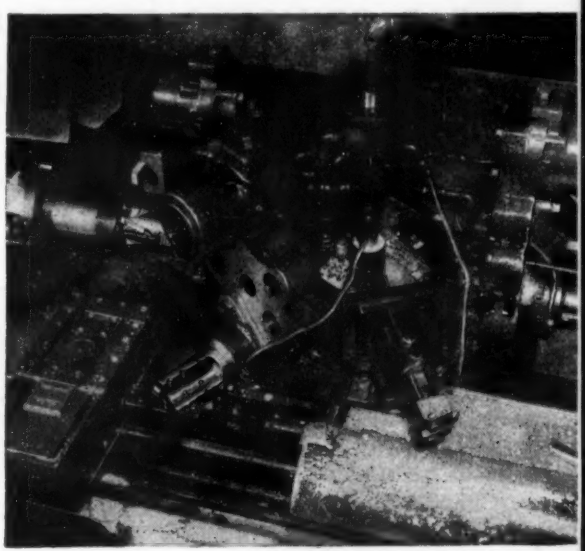
View showing tooling set-up for first chucking. Operations include rough turning flange, rough facing both sides of flange, drilling, rough counterboring, facing boss, chamfering flange I.D. and O.D., finish counterboring, semi-finish turning flange, finish face both sides of flange, boring hole, and finish turning flange.

Two Foster Fastermatics operated by an inexperienced operator perform 23 operations in 2 chuckings on an airplane motor housing part made from steel forgings. These 23 operations include turning, facing, counterboring, chamfering, drilling and boring. A completed part is produced every 6 minutes which includes 2 loadings and 2 unloadings of the finished part. Floor-to-floor time for the first chucking is 6 minutes and for the second chucking is 5¾ minutes.

This production is a result of the automatic cycling of the machine which permits the operator to load and unload the second machine while the first machine is in production. The automatic speed control and hydraulic feed system of Foster Fastermatics permit tooling arrangements to insure the maximum operating efficiency. During the 23 operations on this part, 4 speeds of 51, 91, 148 and 263 r.p.m., and 10 feeds of .005" to .0118" per revolution automatically controlled for each operation are used.

Because each tool functions at its maximum efficiency as a result of the use of the proper feeds and speeds, the greatest tool life is obtained. Average tool life on this job was 46 hours using high-speed tools with the exception of the finish turning operation where cemented carbide tools were used.

It was interesting to note that on this job these machines have been in continuous operation for over 3 years without interruption for any mechanical reason. This clearly indicates the stamina of the hydraulically actuated turret lathe. This job is also another example of how the automatic cycling features of the Fastermatic permit the use of inexperienced operators and still maintains maximum production. The operator running these 2 machines was formerly a sweeper with no former machine operation experience.



View showing tooling set-up for second chucking.

JOB FACTS

Machine—Two 2F Fastermatic Turret Lathes.

Part—Motor Housing (Airplane Propeller).

Material — S.A.E. 1020 Steel Forging, Annealed (Dead Soft).

Floor-To-Floor Time—
1st Chucking—6 min.
2nd Chucking—5¾ min.
Finish to permit subsequent finishing operations.

Speeds and Feeds—

1st Chucking

1st Position—148—.0118"
2nd Position—148—.0098"
3rd Position— 91—.0075"
4th Position—148—.0063"
5th Position—148—.008"
6th Position—263—.005"

2nd Chucking

1st Position—This position skipped
2nd Position—This position skipped
3rd Position—148—.0066"
4th Position—148—.006"
5th Position—148—.0078"
6th Position— 51— .0079"

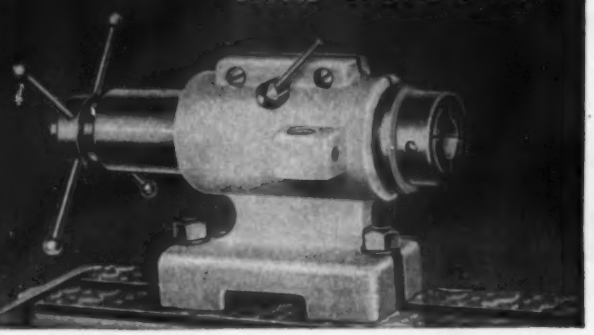
(Left) Parts before and after machining of first chucking.

FREE!
Production Men Get the Facts in New "Fastermatic" Catalog

Get the complete facts and details of these highly productive, Foster Automatic Turret Lathes in the new "Fastermatic" catalog. Write to Foster Division, 1100 Beardsley Avenue, Elkhart, Indiana, for your free copy.

INTERNATIONAL MACHINE TOOLS
Foster Division - Elkhart, Indiana
INTERNATIONAL DETROLA CORPORATION
DETROIT, MICHIGAN • ELKHART, INDIANA • INDIANAPOLIS, INDIANA
FOSTER FASTERMATICS • LIBBY HEAVY DUTY TURRET LATHES • STANDARD TOOLS • SUPERFINISHING MACHINES • SPECIAL MACHINE TOOLS

"Everybody" knows that tool steel is a WAR WEAPON!



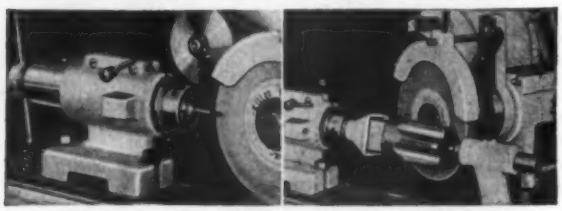
For use on any make tool grinder!

YOUR taps are made from FINE TOOL STEEL!

Maintain them with a knock-out TAP GRINDING FIXTURE!

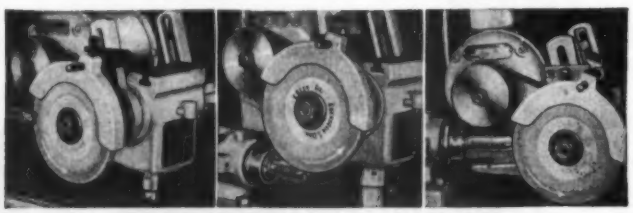
All grinding operations necessary on a tap are done with one fixture with one set-up. Taps commonly considered ready for discard now can be salvaged and returned to service.

Taps held in collets are insured against inaccurate grinding. Operators with little tool room experience soon become efficient with the new K-O TAP GRINDING FIXTURE.



Grinding the relief on a No. 10 tap

Sharpening a 2½" tap



Sharpening a Standard tap

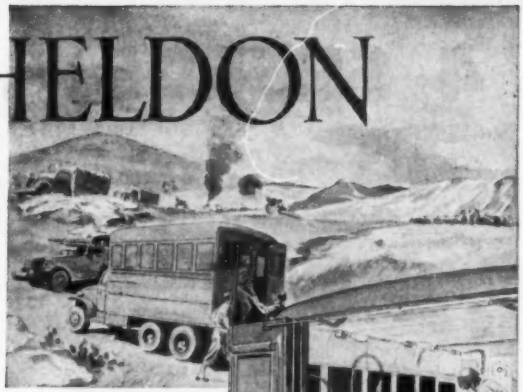
Grinding the flutes

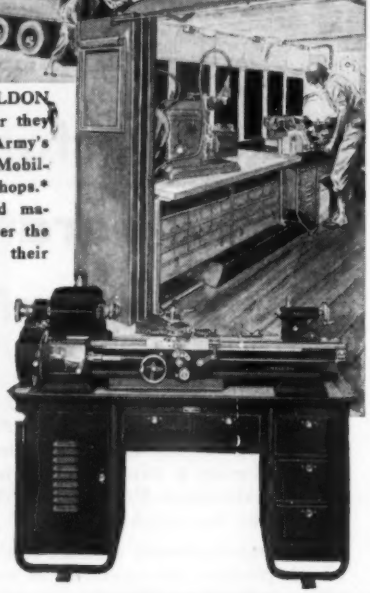
Salvaging broken tap

K.O. LEE CO.

ABERDEEN, SO. DAK.

SHELDON





Wherever our Armies go, SHELDON LATHES move with them for they are basic equipment in the Army's Mobile Machine Shops and Mobilized Instrument Repair Shops.* These compact truck-mounted machine shops are found wherever the going is toughest for it is their job to keep all mechanized ordnance operating efficiently. It's a big assignment, and we are proud that SHELDON Precision Lathes are selected to handle it. *SHELDON Lathes are also standard in the Marine Corps Mobile Shop Trailers and on many Naval Craft.

SHELDON MACHINE CO., Inc.

4234 N. Knox Ave., Chicago 41, U. S. A.

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

ROCKFORD MACHINE TOOL CO.

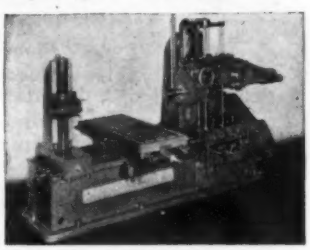
Hy-Draulic

Shapers . . Planers . . Slotters . . Shaper-Planers

ROCKFORD, ILLINOIS, U. S. A.

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.

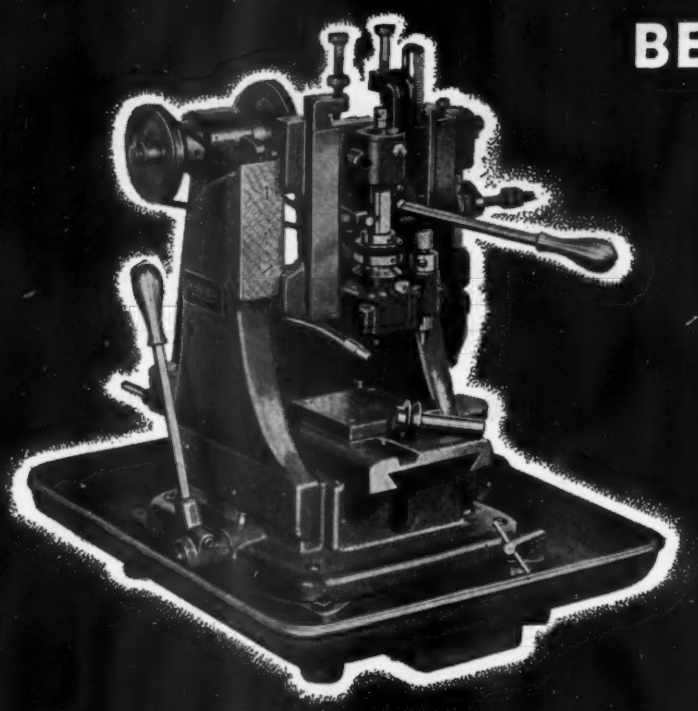


Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.

Hudson, Mass., U. S. A.

You Can Do a Wide Range of Work With This Wade MOTOR DRIVEN BENCH PROFILER



FOR SMALL PROFILING, MILLING, SLOTTING, RECESSING AND ROUTING OPERATIONS

SPECIFICATIONS

Working area:
2" x 4" horizontal, 1¼" vertical
Fixture block: 4" x 4" x ½"
Work surface of table: 4¼" x 4"
Travel of vertical slide: 1¼"
Travel of table: 4½"
Travel of cross slide: 2"
Cutting tool collet: Any standard size up to 5/16" dia. Standard ¼" collet supplied unless otherwise specified.
Distance of table to nose of spindle, when down: 2¾"
Center distance, cutter spindle to follower: Approx. 2-1/16"
Follower cutter spindle: No. 2 B&S taper
Motor: Standard ¼ h.p., 3-phase
Speeds: Four speeds ranging from 1000 to 8000 RPM
Dimensions: 19" wide, 24" long, 22" high.
Weight: Net, 260 lbs., boxed, 285 lbs.

Wade

Bench Lathes and Profilers For Precision, Versatility And Stamina

You can do a wide range of precision work with this Wade Motor Driven Bench Profiler . . . work such as profiling, milling, slotting, recessing and routing operations . . . on a variety of small parts such as watch and clock plates, clock mechanisms, mechanical time fuses, parts for small firearms, range finder parts, typewriter and adding machine parts, etc.

It is a precision built profiler for production work. Women and unskilled help can quickly become expert in its operation and turn out duplicate precision work within exceedingly close tolerances.

The Wade Bench Profiler is a time and money saver . . . a small, moderately priced machine tool that will pay for itself over and over in your production line.

Write today for catalog

THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

SPEED - ACCURACY - on 95% of All Cut-off Work

KALAMAZOO METAL CUTTING BAND SAW

DRY MODEL—Machine illustrated is suitable for all intermittent cutting. All models portable and plug into light socket. Casters optional.

WET MODEL—Machine with coolant permits high speed, production cutting. Attachment operates clean and does not interfere with convenience or portability.

★ **Does most of the work of Large — High Priced Machines.**

Quick set-up—automatic operation—continuous cutting—and precision, wafer-thin cuts. Produces MORE WORK—BETTER WORK and SAVES LABOR and MAINTENANCE.

If you are cutting bars, angles or tubes to lengths, this is the NEW, MODERN, ECONOMICAL METHOD

Low cost recommends it for SAVINGS and EFFICIENCY on hundreds of jobs.

Two sizes—8" x 16" and 8" x 24". Four speeds for any metal.

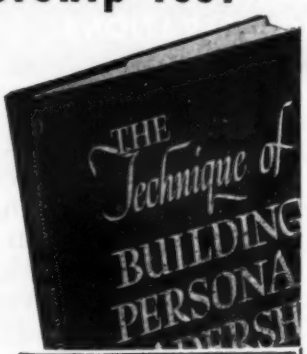
Write for Bulletin or Ask your Dealer!

MACHINE TOOL DIVISION, KALAMAZOO TANK & SILO COMPANY KALAMAZOO, MICHIGAN

Give yourself this leadership test —

How many traits of the successful leader have you?

Check over the qualities of successful leadership proved of greatest value to outstanding men of our time, and learn how you can develop and strengthen these traits in your personality and character. Personal magnetism—directness—poise—self-confidence — optimism — tact — progressiveness — perseverance—decisiveness; here are a few of the qualities determining the outstanding careers of such men as Lloyd George, Oliver Wendell Holmes, Jr., and Marshall Field. This book will show you how to bring out these traits in yourself and how to use them advantageously for important executive work.



Just Published!

By DONALD A. LAIRD
239 pages,
32 illustrations, $2.00

The Technique of Building Personal Leadership

Learn how:—

FRANK C. BECKWITH, chairman of the Hamilton Watch Co., controls difficult people;

FRED O. BOHEN, president of the Meredith Publishing Co., helps his men stick to difficult jobs;

GEORGE A. EASTWOOD, president of Armour & Co., acquired executive strength;

ROBERT F. BLACK, president of White Motor Co., at forty-six, judges men;

BOB THORNTON, forced out of business at thirty-six, started one of the largest banks in the southwest.

This book gives you the inside story of 32 of our outstanding business leaders and how they got there in a hurry, and it develops a clear path for every man who wishes to climb higher and higher in his chosen field.

In this book, Dr. Laird explores what goes into making men of great personal magnetism. He shows that this personality can be acquired by you, as he has continually demonstrated with foremen, executives and salesmen in hundreds of our largest firms.

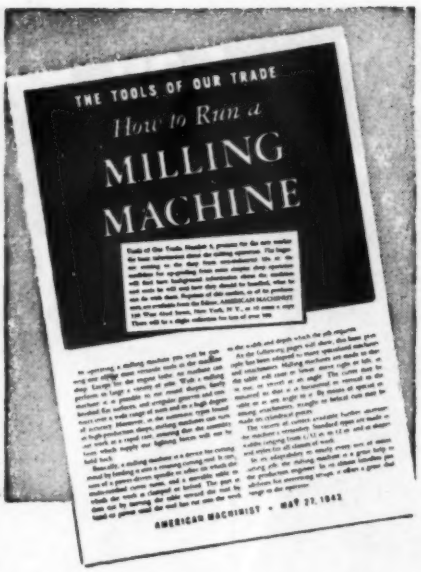
See it 10 days' on approval

—SEND THIS McGRAW-HILL COUPON—

McGraw-Hill Book Co., Inc.,
330 W. 42nd St., New York City 18

Send me Laird's THE TECHNIQUE OF BUILDING PERSONAL LEADERSHIP for 10 days' examination on approval. In 10 days I will send $2.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....
Address .....
City and State .....
Position .....
Company ..... A. 10-12-44
(Books sent on approval in U. S. and Canada only.)



HELPFUL INFORMATION FOR TRAINING NEW WORKERS ON MILLING OPERATIONS

A 16-page, illustrated, practical training course on milling. The beginner coming to the shop from non-industrial life or the candidate for up-grading from some simpler shop operation will find here background information about the machines and tools he will use, how they should be handled, what he can do with them.

Appearing originally in *American Machinist* as No. 3 in the series of special training sections on "Tools of Our Trade", the demand for this feature in reprint form clearly indicates the value placed upon it.

Send for the number of copies you need while they are still available. Price 10c each; less in lots of 500. Use coupon below.

MAIL COUPON TODAY!

AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

Please send me _____ copies of "How to Run a Milling Machine". Enclosed is $_____ (in stamps, check, money order)

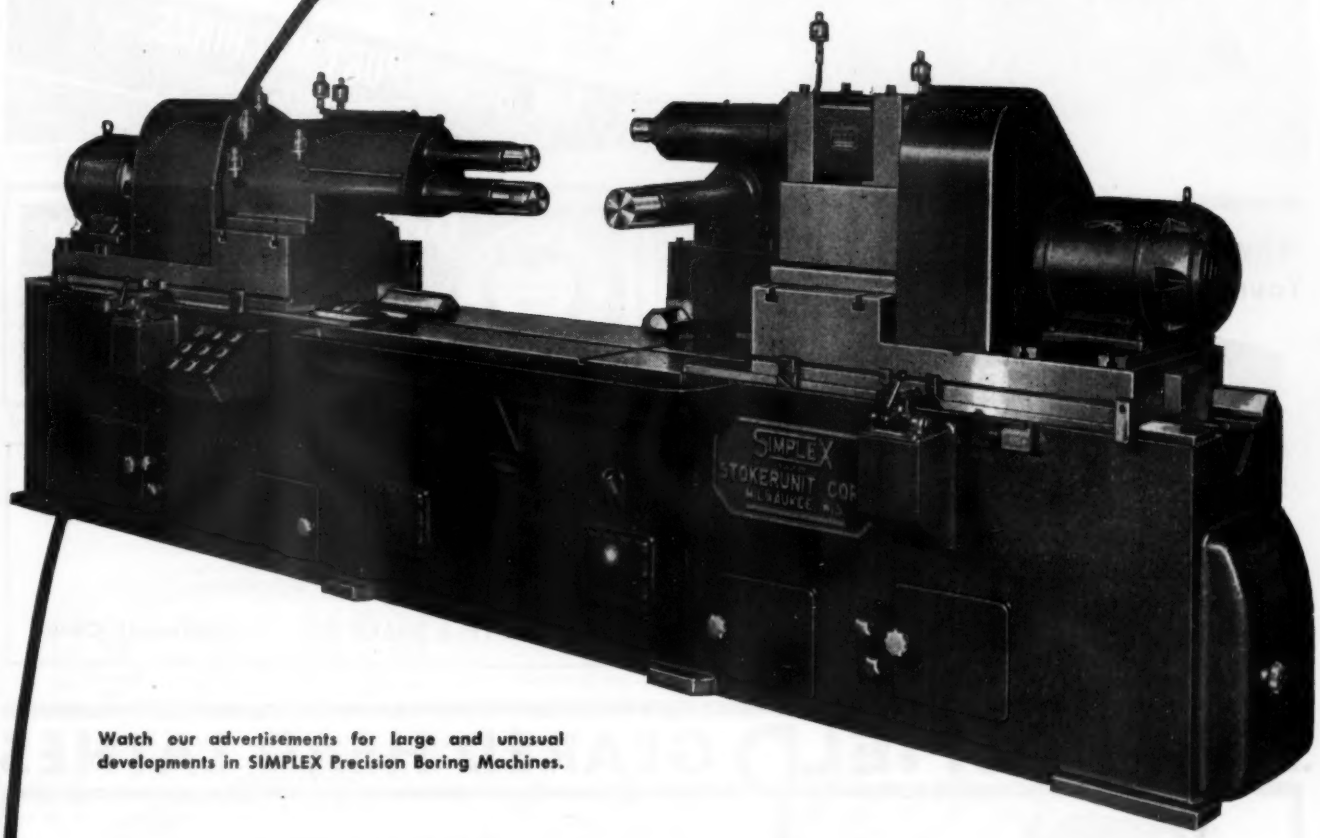
Name _____
Title _____
Company _____
Address _____
_____

AMERICAN MACHINIST
330 W. 42 St., New York 18, N. Y.

SIMPLEX

When a leading tractor manufacturer contracted to build a transmission for a military tractor, they realized they could not take any chances with Government inspection. A SIMPLEX 3U 3-way Precision Boring Machine, large enough to bore a unit 4' long, made a quick and easy job of getting them out swiftly — and right!

The transmission case was approximately rectangular, 48" long, 19" wide and 21" high. There were six bores, ranging from 2¾" to 6½". Most of them were located so deep in the casting that extension type spindle heads were necessary. With this arrangement there was very little tool overhang, accuracy was easily maintained, tool life increased, chatter avoided.



Watch our advertisements for large and unusual developments in SIMPLEX Precision Boring Machines.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring Machines and Planer Type Milling Machines

4524 West Mitchell Street, Milwaukee 14, Wisconsin

Bridgeport

TURRET MILLING MACHINE
. . . the all-purpose machine with unparalleled range of utility

This machine will mill, drill, bore and shape at all conceivable angles. All angular settings in one plane are achieved by merely turning hand wheel controlling keyed overarm. It has always been furnished with the well known Bridgeport High Speed Milling Attachment which provides for drilling and boring at all angles without changing work setup.

Column, knee and table are of rugged construction. Wide ways and taper gib assure accurate, vibration-free operation. Entire machine is anti-friction bearing mounted.

NOW EQUIPPED WITH NEW SHAPING ATTACHMENT

This new attachment on back end of overarm is of sturdy construction and can be set at all angles. It provides for shaping such work as large and small dies and molds as well as for intricate production jobs involving slotting operations.

The "Bridgeport" Shaping Attachment is now available to every owner of Bridgeport Turret Milling Machines. Shaping and Milling Attachments can be mounted on all types of milling machines. They are in extensive use on special production equipment.

CONDENSED SPECIFICATIONS

Longitudinal Feed—20"
Cross Feed—9"
Vertical Feed of Knee—16"
Table—9" x 32"
Spindle Speeds—(Milling Unit) 275, 425, 700, 1050, 2100, 4250

WRITE FOR ILLUSTRATED BULLETINS GIVING FULL DETAILS

THE BRIDGEPORT MACHINES, INC.
Bridgeport, Conn.

Why the Vertical Roto-Matic Will Increase Your Drilling Production

. . . is explained in this **FREE BOOKLET**

The ROTO-MATIC principle of continuous operations will enable you to drill, ream, bore, face, mill, etc., more parts in less time. Write for this booklet today; learn the many advantages of the ROTO-MATIC and how it can be specifically applied to your work. Ask for Bulletin No. C-100.

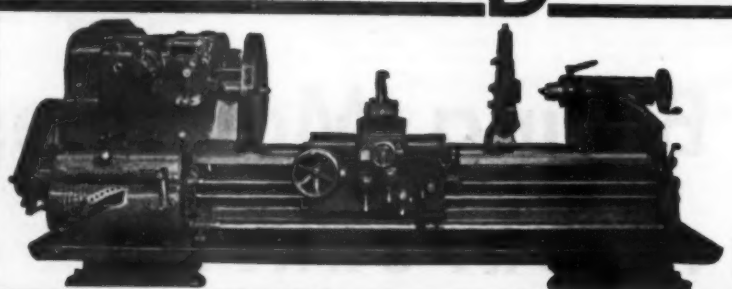
Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. • Milwaukee 14, Wisconsin

LELAND-GIFFORD COMPANY · WORCESTER MASS. U.S.A. · MACHINE TOOLS · CRANK SHAFTS

Drilling and Tapping Machines
(Automatic and Semi-Automatic)
LELAND GIFFORD CO.
WORCESTER, MASS.

SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke
THE SMITH & MILLS CO. Cincinnati, Ohio

SPRINGFIELD GEARED HEAD LATHES



for peacetime or war production!

A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes—flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.

SIMPLICITY + ADAPTABILITY

Owners of Oster "RAPIDUCTION" Lathes employing women operators to replace former male operators, now in the Armed Forces, are high in their praise of the SIMPLICITY and ADAPTABILITY of Oster Lathes. These modern machines have no complicated features to confuse inexperienced people who learn rapidly to maintain high standards of accurate workmanship on Oster "RAPIDUCTION" Lathes.

The SIMPLICITY and ADAPTABILITY of Oster "RAPIDUCTION" Lathes combined with their accuracy and ease of operation are advantages that explain the continuing demand for these popular machines. In the transition from production for war to production for peace, the advantages of Oster "RAPIDUCTION" Lathes will continue to be important factors in maintaining efficient, low cost production in metal-working plants.

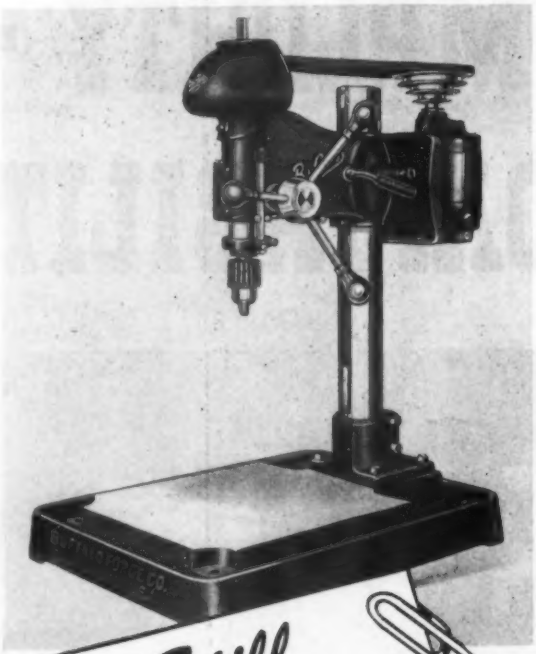
OSTER

MEMO

Commitments on definite delivery dates for Oster "RAPIDUCTION" Lathes are impossible to make under existing conditions but complete information will be furnished promptly. Plan NOW for future needs which may arise sooner than you, or we, anticipate.

"Rapiduction" LATHES

THE OSTER MANUFACTURING COMPANY, 2049 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.



Still the No. 1 PRODUCTION DRILL

The Buffalo No. 15 Drill was designed for "manufacturing" sturdiness—a necessary ruggedness which shop tools must have to stand-up with long-shift, semi-skilled labor. The No. 15 is simple—so that adjustments are easy. It is accurate enough for all ordinary manufacturing operations.

And it's STILL the No. 1 choice of production men for turning out 24 hours work every day!

Several models, in bench and floor types—reasonably good delivery. Write today for Bulletin No. 2963-D.

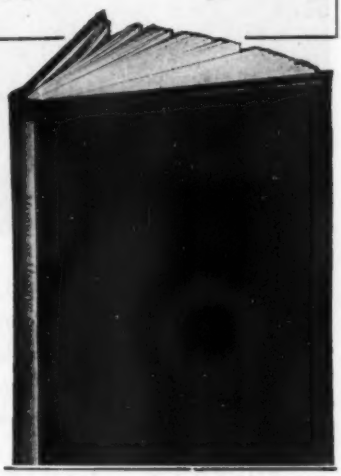
BUFFALO FORGE CO.

448 Broadway Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" No. 15 PRODUCTION DRILL

Handy machine shop methods and calculations in One Volume



This book offers an unusual compilation of instructional, problem, and reference material, designed to give trainees in machine shop work and engineering a practical understanding of important machine shop processes. Such varied fields as hand tools, speeds and feeds, precision measuring, indexing, and press work are here included in a single book, with emphasis on self-study helps.

Just Published

Manual of Machine Shop Practice

By OTIS BENEDICT, JR.

Assistant Professor, Department of Shop Practice, Pratt Institute, School of Science and Technology

244 pages, 5 x 7⅞, 155 illustrations, $1.75

Here is a book presenting concisely and clearly the fundamentals of a number of machine shop operations, plus problems and experiments demonstrating their application, and reference material making the book largely self-contained for self-study purposes.

Consult it for practical aid in such problems as:

—reading and using precision measuring instruments
—determining cutting speed and return speed for planers
—calculating spur gears
—power required for lathe work
—finding cutting speeds for boring and turning operations
—time required to machine work in the milling machine or drill press
—calculations for tapdrills
—cutting threads in the engine lathe
—taper turning in the engine lathe
—differential indexing using simple and compound gearing
—cutting spirals in the milling machine

and many others

10 days' Examination — Send this Coupon

McGRAW-HILL ON-APPROVAL COUPON

McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

Send me Benedict's Manual of Machine Shop Practice for 10 days' examination on approval. In 10 days I will send $1.75 plus few cents postage or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

City and State .....

Position .....

Company .....A. 10-12-44

(Books sent on approval in U. S. and Canada only.)

See this New 30-Minute Movie and Save Months of Postwar Planning

Gorton Presents "An Exact Duplicate"

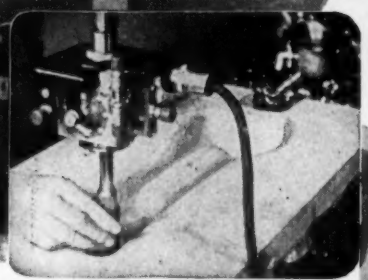
30 MINUTES OF LATEST TECHNIQUES IN "TRACER-CONTROL"

MILLING...DUPLICATING...ENGRAVING..

This new Gorton Sound Motion Picture, in colors—"An Exact Duplicate"—shows latest techniques on many jobs like those you'll tackle after "V-E Day."

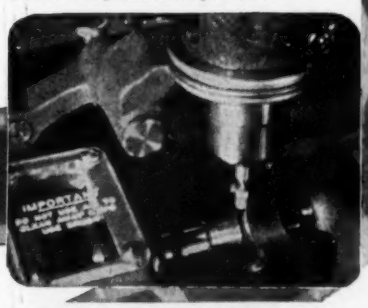
Yes, the 30 minutes that you'll spend seeing "An Exact Duplicate" may give you the practical solution to that tough postwar production problem that is on your drawing board today. This motion picture, filmed in color and sound under actual machine shop conditions, shows Gorton Tracer-Controlled Machines *in use* on plastic die and mold jobs, forging dies, high production profiling, milling, 2 and 3 dimensional engraving and manual and electric duplicating.

Available now without charge—for showing to technical societies, company groups, conventions, training schools, and other organizations. Write us today for further information, giving choice of three tentative dates.

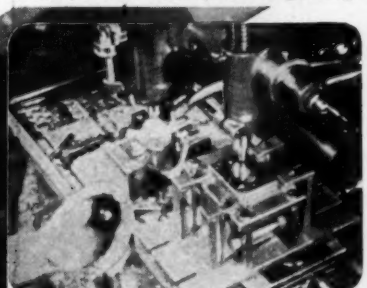


(Above) Complex irregular shapes and contours are easily duplicated from inexpensive plaster models.

(Above) Flexibility of Duplicator Control solves many industrial problems.



(Above) A revolutionary idea in grinding.



(Above) It is simple to do production profiling of parts which must be held to close tolerances.

GEORGE GORTON MACHINE CO.

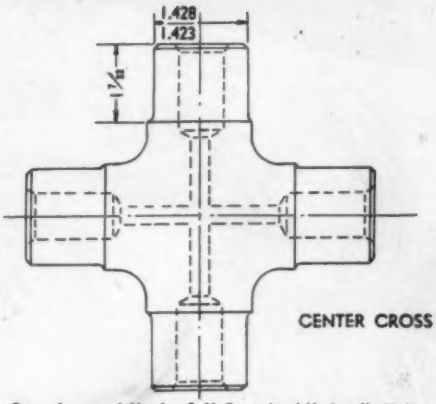
1310 RACINE STREET, RACINE, WISCONSIN, U.S.A.

FOUR UNIVERSAL JOINT ARMS
MILLED in 11½ Seconds

HOEFER BUILDS 4-way, 5 h. p. Units
Complete with base and fixture

SAE 4620 Forging used for center crosses for all sizes of motor propelled war machines required hollow milling operation of 1-7/16" diameter. Speed 50' per minute. Feed .050" per revolution. Travel 1¼".

Special purpose machine for this job featured central hydraulic controls to move heads simultaneously.



CENTER CROSS

One of several Hoefer Self-Contained Hydraulic Units, mounted on a suitable inexpensive base or on another machine, make up a special high production machine at a fraction of the cost for specially designed equipment.

Possibly our experience can be of value to you in considering your present production problems and in planning for the future.

Hoefer's Whole Business is Holes . . . .

HOEFER MFG. CO. *Freeport, Ill.*

REID Automatic Feed Surface Grinder No. 2A

Our Dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

A Proven Product for Over a Quarter Century with Thousands in Use Daily

Send for Descriptive Literature
EXCELLENT DELIVERIES

Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.
Agents in all Principal Cities Throughout the World

PINCH HITTER . . . for
TIGHT SITUATIONS

When things get tied up and the situation calls for a pinch hitter to clear the bases, the LINLEY comes to the rescue . . . makes good.

DIE WORK, JIG AND MODEL MAKING, METAL PATTERNS, DRILLING AND REAMING

Jobs such as these, demanding precision and speed, can tie up expensive machinery in busy shops . . . cause bottlenecks. The compact, versatile LINLEY has been specifically designed to solve this problem. Quick set-up, easy changeover, 8 speeds to 4250 r.p.m., velvet feed, micrometer setting, ample table size and travel, yet only 18½" x 20" floor area is required.

Save your larger machines for their rated capacity . . . let the little LINLEY keep the decks cleared.

SEND FOR BULLETIN

LINLEY

BROTHERS COMPANY
864 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

One section of a special gear case fabricated and assembled in its entirety by Mahon men and machines.

The EXPERIENCE *and* EQUIPMENT *to handle any assignment*

Methods developed by Mahon have set a new standard in the production of welded steel plate products in all sizes, shapes and weights. These methods call for a vast amount of specialized modern equipment. Without it the enormous production that goes through our plant each day would be utterly impossible.

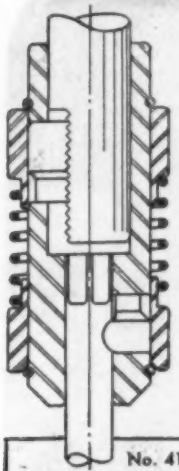
The forming roll (shown above) for example, is but one item in a long list of tools comprising flame cutters, saws, power brakes, automatic welding machines, positioners, annealing furnaces, sand blasting apparatus, and a vast array of other equipment — all essential to the handling, shaping and fabricating of heavy steel plates in volume.

Our DESIGN ENGINEERING SERVICE is proving particularly helpful to manufacturers like yourself. First: in determining whether your product is adaptable to steel plate fabrication. Second: in assisting you to redesign it so that it may be produced practically and economically.

THE R. C. MAHON COMPANY

DETROIT 11 — CHICAGO 4

Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products



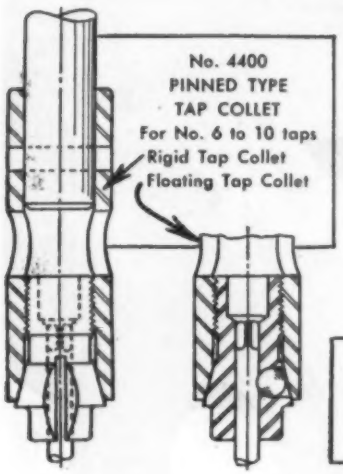
Ettco-Emrick

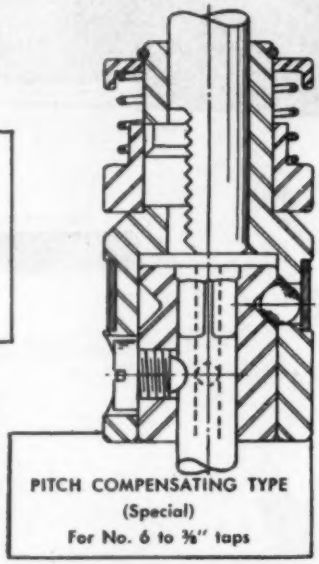
COLLET TYPE TAP CHUCKS

Can be used on all standard machine tools, and on screw machines, turret lathes and other automatic machinery. Particularly adapted to multiple tapping on close centers. The special shanks can be supplied with any standard Morse taper. Recommendations on right type to use for specific applications, always available.

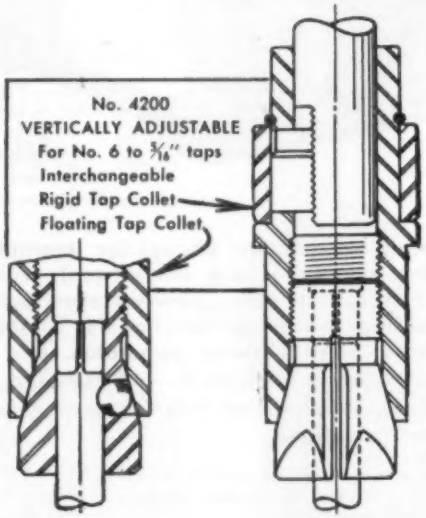
Drawings are actual size.

No. 4100
VERTICALLY ADJUSTABLE
FLOATING TAP COLLET
TWO SIZES { For No. 6 to 3/8" taps
For No. 10 to 1/2" taps





PITCH COMPENSATING TYPE
(Special)
For No. 6 to 3/8" taps



ETTCO TOOL CO.
590 Johnson Ave., Brooklyn 6, N. Y.
Detroit 1 Chicago 6

OVER 25 YEARS SPECIALIZATION IN DESIGNING AND BUILDING DRILLING AND TAPPING EQUIPMENT

1/3 More Parts

WITH A BARKER WRENCHLESS CHUCK

Barker Wrenchless Chuck—two-jaw type.

Barker Wrenchless Chuck—three-jaw type.

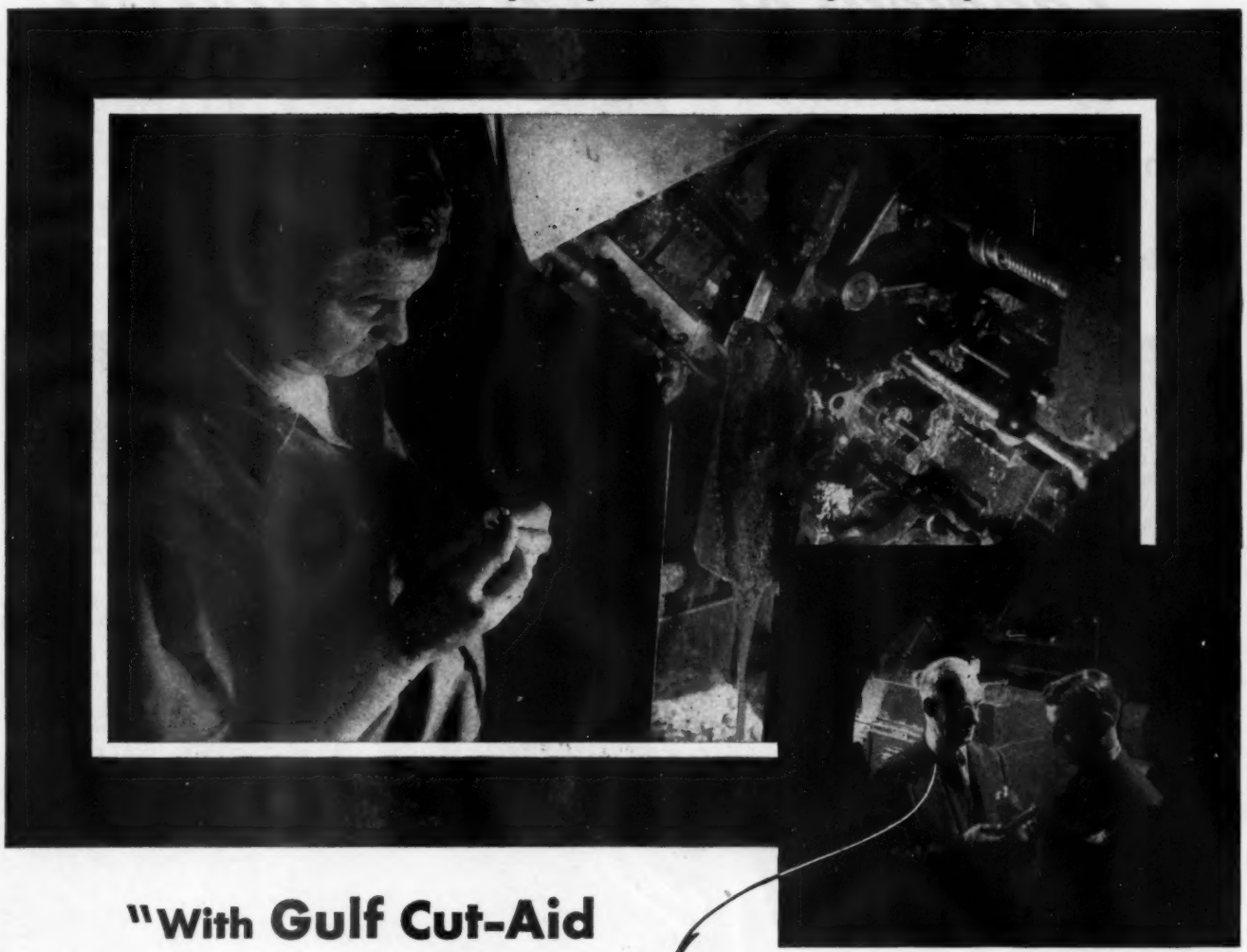
Pieces-per-hour went up and stayed up when this P & J Automatic Lathe was equipped with a Barker Wrenchless Chuck. Top output before the change was 18 pieces—the Barker Chuck stepped up production to 24 pieces—an increase of one-third. This user operates six Barker Chucks that are giving uniformly efficient service.

Continuous generous dividends in time saved and increased production are being earned by the hundreds of users of Barker Wrenchless Chucks. Are you interested in similar results?

Write today for full information.

THOMAS HOIST CO.
Chuck Division
20 South Hoyne Avenue, Chicago 12, Illinois

The big battery of modern screw machines in this plant produces several different types of aluminum aircraft parts with the help of Gulf Cut-Aid. In the lower photo a Gulf Service Engineer (right) is shown consulting with the plant Superintendent on machining aluminum caps.



"With Gulf Cut-Aid we increased aluminum cap production 25% —— tool life over 100%"

says this Superintendent

GULF CUT-AID does a better job on aluminum than any other cutting fluid we've ever used," says this Superintendent. "With this outstanding new cutting oil we stepped up production of aluminum caps 25%, increased tool life well over 100%, and are getting better threads."

Gulf Cut-Aid consistently shows better results in cutting aluminum and other nonferrous metals!

In addition to its superior performance on this class of work, Gulf Cut-Aid has another important function—it's an effective energizer for other cutting oils, regardless of type or viscosity. When blended in the proper proportion with other cutting oils, depending upon job requirements, the use of Gulf Cut-Aid makes possible higher production speeds and results in improved finish, longer tool life, or both.

Call in a Gulf Service Engineer today and let him show you how Gulf Cut-Aid and other Gulf quality cutting oils can help you with your production problems. Write, wire, or phone your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company · Gulf Building, Pittsburgh 30, Pa.

BACK THE INVASION . . . BUY MORE WAR BONDS

Preview of Dependability

American Flexible Metal Hose Proves Its Fitness Before Leaving The Factory

BUY WAR BONDS
Buy More Than Before

EVERY LENGTH of American Flexible Metal Hose, before leaving the factory, is thoroughly tested under pressure as a final check. This operation is typical of the care exercised in the manufacture of AMERICAN products, and is one of the reasons why AMERICAN maintains such an enviable reputation for dependability.

Wherever a practically indestructible, flexible, airtight conveyor is required for oil, gas or liquids; for vacuum service or for isolating vibration, it is logical to turn to American Flexible Metal Hose.

American Flexible Metal Hose withstands heat and high pressures without deterioration. It is resistant to many of the corrosive influences which render non-metallic hose impractical to use. Furnished in bronze and other workable metals with or without couplings, there is a type for nearly every industrial purpose.

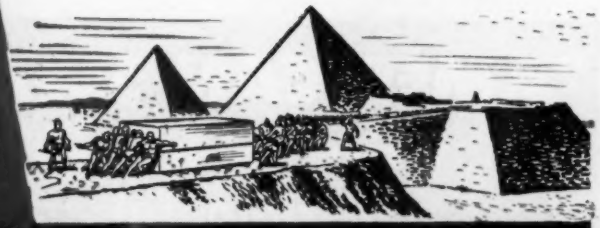
The Technical Department of The American Metal Hose Branch of The American Brass Company is prepared to offer suggestions and make recommendations regarding special applications. 44190

ANACONDA

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

WHAT HAS THIS TO DO WITH BROACHING?



THE Alcan Highway, hurled through hitherto inpenetrable forests, across mountains, rushing torrents and treacherous muskeg . . . all conquered by man and his machines . . . machines that owe, in great measure, their very existence to the elementary principle of the inclined plane. Used in ancient Egypt it enabled the engineers of the Pharoahs to move into position by sheer human effort the massive blocks of stone that formed the Pyramids. This same principle, upon development became the worm gear — that efficient instrument of power transmission — used in nearly every field of power application . . . without which our machine built civilization might well collapse.

EVEN as the principle of the inclined plane has influenced daily living in the widespread use of the worm gear, so also has Broaching, developed through successive phases from a crude beginning. Today, thousands of parts are made quicker, cheaper and better by modern applications of the broaching principle. In keeping with the trends of the past, even greater developments are in store for the world of tomorrow.

By driving steel balls, and later, crude drifts through the heated part . . . clever builders broached the hubs of the famed covered wagons.

ARMY NAVY

The LAPOINTE Machine Tool Company

HUDSON, MASSACHUSETTS, U. S. A.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

"AMERICAN SWISS" Swiss-Pattern FILES
write their own testimonials

At the plant of a metal specialty manufacturer:
"AMERICAN SWISS" Swiss-Pattern Files out-file and outlast all other makes that we have tried."

FREE CATALOG
SENT ON REQUEST

The ability of "AMERICAN SWISS" Files to outperform is the natural result of the way these precision tools are made. Their size is held to close limits—with a tolerance of only ±.002 in. in some shapes. Their uniformity of hardness is assured by heat treatment with automatic control and regulation to within ±5°F. And every step in their manufacturing process is conducted by long-skilled craftsmen guided by 45 years of experience in specializing on Swiss-Pattern Files.

For best results and lowest costs on your intricate and accurate filing jobs, be sure to standardize on "AMERICAN SWISS" Swiss-Pattern Files—obtainable from our Distributor.

AMERICAN SWISS FILE & TOOL CO., ELIZABETH, N. J.

ASK FOR THEM BY NAME

American Swiss

SWISS PATTERN FILES

When You Order Your Favorite Brand of HACK SAW BLADES Specify this—

"made from INGERSOLL D-B-L STEEL"

5 YEARS EXPERIENCE in the Production of this Lower Cost Type of HIGH SPEED STEEL for HACK SAW BLADES

★ ★ ★ ★ ★

Specify Ingersoll D-B-L Steel for your Hack Saw Blades on its 5-year Record of Past Performance.

INGERSOLL D-B-L

(Tungsten .....5.00-6.00)
(Molybdenum..4.00-5.00)

The remarkable performance of Ingersoll D-B-L...its relative freedom from decarburization...its tough cutting quality and its high impact resistance...plus its lower cost, have made it a wartime favorite.

"A Borg-Warner Product"

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
NEW CASTLE, INDIANA
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

New Book on Tools for Obtaining Accurate Thread Forms in Less Time

Remarkable savings are being made in thread grinding through the use of the new Tru-Thread Diamond Tools for dressing thread grinding wheels.

Tru-Thread Diamond Tools employ a radically new principle, applied for the first time by Wheel Trueing engineers, and utilize the hard characteristics of a diamond of a shape never before used for such a purpose.

The results of this new development are reported by users who tell us—for example—that with Tru-Thread Tools they are running three to four times as many pieces as they obtained with their previous tools.

Tru-Thread Tools obtain wheel forms quickly and accurately and leave the wheel grain sharp and free-cutting. Wheels cut clean, hold their form longer and grind more pieces between dressings. Wheel cost, tool cost, and cost per piece all are reduced accordingly.

These tools, which are made in types for dressing each specific form, are completely described and illustrated in a new booklet which we will be glad to send you on request. If you have thread grinding equipment, this booklet will point the way to substantial savings. Send for your copy.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue
Detroit 6 • Michigan
575 Langlois Avenue
Windsor, Ont. • Canada

These tools of

MO-MAX

TRADE MARK REG. U.S. PAT. OFF.

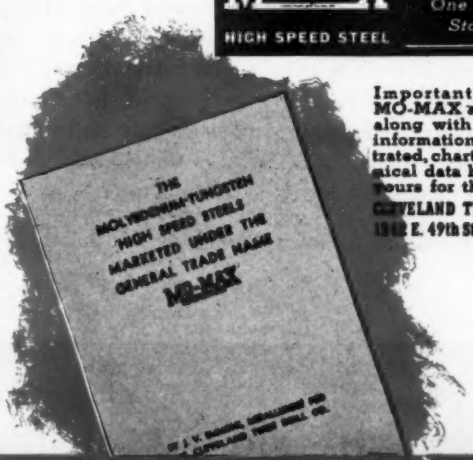
HIGH SPEED STEEL

have 154,999,999 brothers!

MO-MAX tool totals run into "box-car figures". For example, one tool maker alone has turned out no less than 155 million cutting tools of MO-MAX. From this you can judge the wide acceptance now enjoyed by the first commercially available molybdenum high speed steel, a steel that has proved its leadership in ten years of test and performance.

MO-MAX has superior cutting quality. It is a happy combination of great toughness and high hardness. Its basic composition is long established and obtainable from any sources. Special varieties, such as the cobalt types and hot die steel have been developed, and are available to those who need them.

MO-MAX HIGH SPEED STEEL — YEAR AFTER YEAR *One Uniform Standard*



Important facts about MO-MAX are presented, along with other useful information, in an illustrated, chart-packed technical data book which is yours for the asking.

CLEVELAND TWIST DRILL CO.
1242 E. 49th St., Cleveland 14, O.

THEY'RE ALL MO-MAX

"LMW"	Allegheny Ludlum Steel Corp.	"Molite 8"	Columbia Tool Steel Company	"Tatmo"	Latrobe Electric Steel Co.
"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S. T. M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex-T-Mo"	Halcomb Steel Co.	"S-N-2"	Vanadium-Alloys Steel Co.
"Star Max"	The Carpenter Steel Co.	"Mogul"	Jessop Steel Company	"Vul-Mo"	Vulcan Crucible Steel Co.

A pioneer producer of

GRINDING WHEELS

makes a promise to industry

THE WIDE and ever-growing industrial acceptance of Peninsular Grinding Wheels can be measured by the fact that today more than 50 diversified fields are represented among the hundreds of manufacturers who depend wholly or partially on Peninsular.

True to a tradition that dates back to 1889, Peninsular has kept pace with every new development in the engineering, manufacture and application of grinding wheels — and in addition, Peninsular has pioneered many new and valuable contributions, both in abrasive wheels and in the machinery for their manufacture.

Today, as America stands on the threshold of reconversion to civilian production, Peninsular renews its promise to industry—to build only to the highest standards of quality and engineering excellence.

A STANDING INVITATION

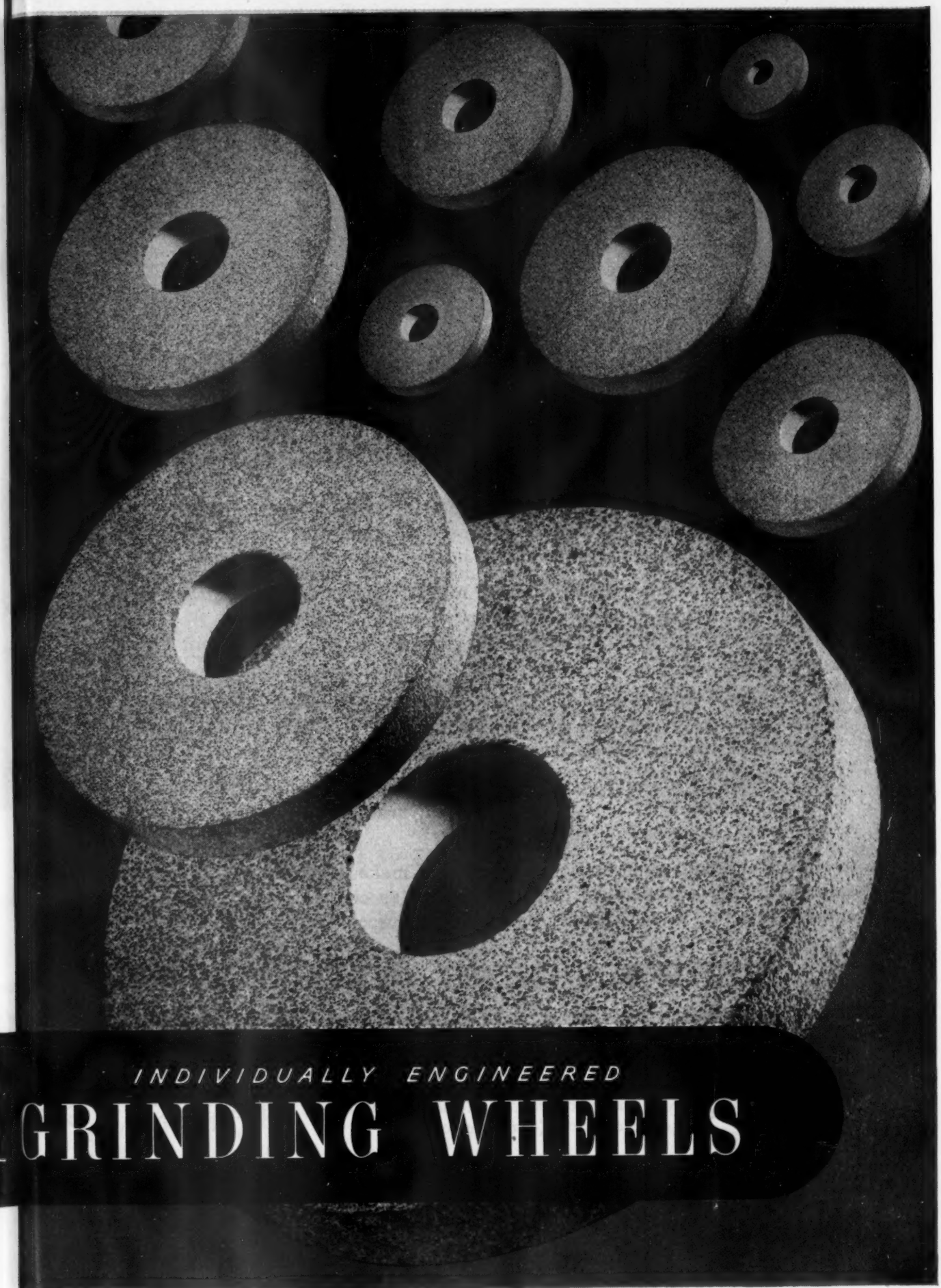
Our expert staff of factory and field engineers are ready today to help in your postwar preparation—with a production, engineering and cost analysis service beyond any offered up to now in the industry.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7, Michigan. *Branch Offices:* Chicago, Cleveland, Newark, Pittsburgh.

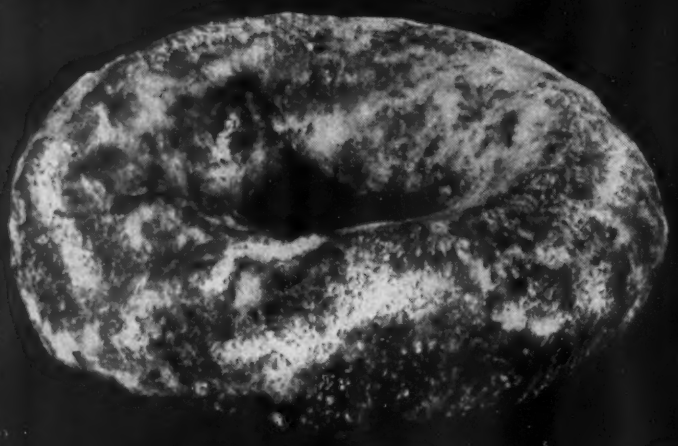
SPECIALISTS IN RESINOID BONDED WHEELS

PENINSULAR GR

SINCE 1889


INDIVIDUALLY ENGINEERED
GRINDING WHEELS

NORTON ABRASIVES



More Doughnuts from "METALITE" Cloth Belts

NO! THEY DIDN'T USE THESE SANDING BELTS ON THE DOUGHNUTS; but they made it possible to turn out more doughnuts through the production of more machines in less time. Glance at just two examples:

"52 pieces—'A' Pipe posts. These had to be ground on the top to fit jig, as well as on the diameter for plating. It would have required 17 face wheels for this job. The material was extra tough. Only one #40 grit belt was used.

3 pieces—D 1099 Doughcan Covers. #46 grit stone wheel, 12½ minutes; #80 grit face wheel, 7½ minutes. 20 minutes to prepare for plating; 5 minutes to rehead wheel. Total time 25 minutes (8⅓ minutes per piece).

12 pieces—D 1099 Doughcan Covers were ground using the Belt Method. These castings had heavy gates on them which had to be removed. Total time 37½ minutes (3⅛ minutes per piece)."

An Idler Backstand—and there are several fine makes—equipped with these outstanding abrasive cloth belts designed for this specific purpose, is not only far superior to set-up wheels, but can be adapted to purposes entirely new.

THE PIPE POST JOB

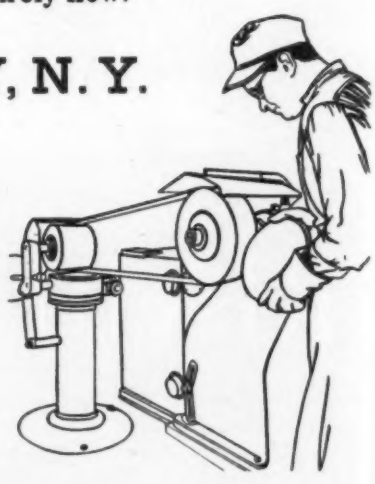
BEHR-MANNING · TROY, N. Y.

(DIVISION OF NORTON COMPANY)

One of our able and practical men will gladly counsel both on machines (which we do not sell) and Metalite Cloth Backstand Belts (which we do).

•

A few lines on your letterhead will bring prompt service with no obligation. That's how Doughnut Corporation, Ellicott City, Maryland, got started.



DOUGHCAN COVER JOB

JOBS WANTED !

by

HEAVY-DUTY CLUTCH WITH A WAR RECORD

To help ships maneuver faster than ever before —to help drags and shovels move earth by the million tons—to help heavy machines produce war implements 24 hours a day—those are the jobs on which the Fawick Airflex Clutch has earned its record.

Controlling power by air pressure, without levers or arms or springs, the Fawick Airflex Clutch needs no adjustments, no lubrication. It absorbs shocks and vibration and corrects for misalignment.

If you have a tough clutch or brake problem in any kind of heavy-duty service, write to our Engineering Department for information—they can help YOU.

for

DIESEL DRIVES
HEAVY MACHINES
DRAGS AND CRANES
PAPER MILLS
RUBBER MILLS
STEEL MILLS
MINE HOISTS
OIL FIELD DRIVES
SUGAR MILLS

* *

12 IMPORTANT OPERATING ADVANTAGES

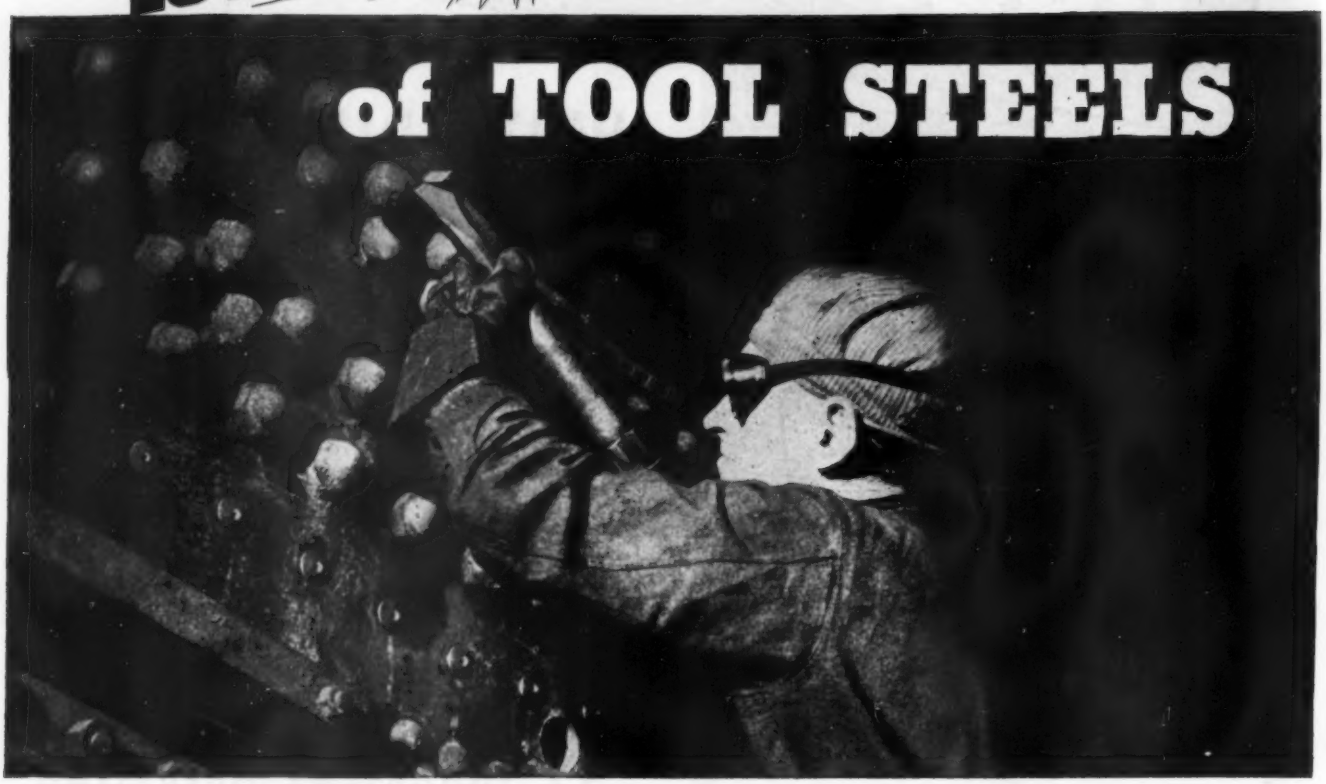
1. Simple in design and operation
2. Flexible control by air
3. No adjustments or oiling—low maintenance
4. Dampens vibration—absorbs shocks
5. Corrects misalignment automatically
6. Smooth starting—no jerks
7. Quick stopping
8. Runs cooler—uniform pressure
9. Controls torque by air pressure
10. Greater capacity—more compact
11. Replaces couplings
12. Remote control by 4-way air valve

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Rd. Cleveland 11, Ohio
In Canada, **Renold-Coventry, Ltd., Montreal, Toronto, Vancouver**
In Britain, **Crofts Engineers, Ltd., Bradford, England**

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

SHOCK TROOPER of TOOL STEELS



Years of experiment and development work have endowed Bethlehem Omega Tool Steel with tremendous shock-resisting properties—the ability to withstand drastic and repeated impact at normal temperatures.

Its normal working hardness is 58-60 Rockwell C; at this figure, it possesses an unusual Charpy impact value. Under test, it shows considerable elongation and reduction of area. This combination of hardness, toughness, and ductility makes it suitable for a wide variety of applications.

Omega was developed primarily for use in cold-battering tools and for machine parts that are obliged to withstand severe shock. It is used successfully in pneumatic chipping chisels, hand chisels, punches, shear blades, cold-forming dies, calking and flue-beading tools, and all other tools in which the ultimate in shock resistance is required.

If you haven't used Omega, we suggest you give it a test under your most unfavorable conditions. Don't baby it, don't coddle it. Give Omega the works. We think you'll agree that it can take punishment.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
BETHLEHEM STEEL EXPORT CORPORATION, New York City

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

OMEGA... one of Bethlehem's BIG 8 Tool Steels

What the world's largest user says about Machine Tools

A manufacturer whose postwar plans call for a hundred thousand machine tools knows what he wants —what kind of machines will best handle his work. And he has told industry about it!

Here are summarized some of the important features this company wants, along with the Acme-Gridley specifications which meet these requirements.

User's Preference	Acme-Gridley Feature
INCREASED FEEDS AND SPEEDS	
More powerful machines to handle new developments in cutting tools and super-speed milling.	Speeds and feeds as fast as modern cutting tools will stand.
ELECTRIC CONTROLS	
Must be properly located, accessible, protected against dirt and damage, and dependable.	Namco Snap-Lock heavy duty Station Control and Limit Switches meet the most exacting military and industrial safety and life requirements.
LUBRICATION	
Every bearing to be lubricated from a central sump. Accessible filters and piping of adequate size.	Central lubrication and coolant systems conform to modern, accepted practices.
ACCESSIBILITY OF PARTS	
Ability to get at all parts quickly without taking entire machine apart, much more important than streamlined appearance.	Machines designed for complete accessibility of operating, tooling, service and adjustment.
CHIP DISPOSAL	
Want wider space between machine ways, with quick chip disposal and separation from coolant.	Entire tooling and cutting area open from both sides, easy to keep clear, and automatic conveyor disposal.

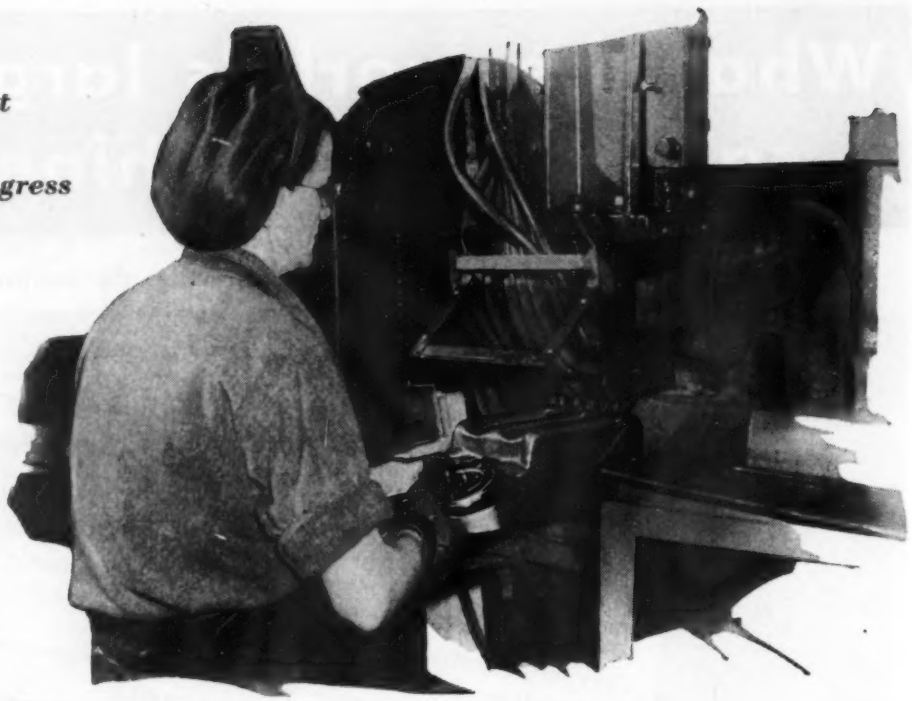
Correspondence invited with manufacturers interested in modern, cost-cutting parts production.

THE NATIONAL ACME CO.

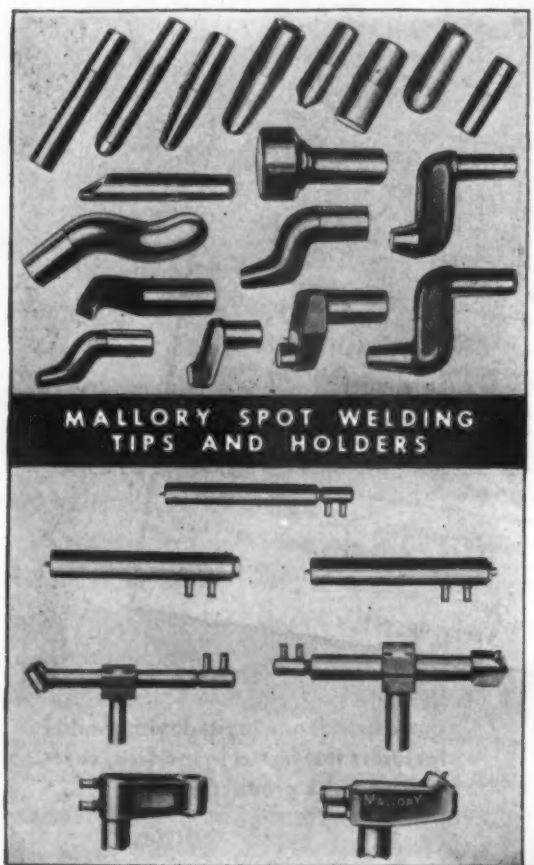
170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE CHRONOLOG • LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

See the Mallory Exhibit
Space E-601
At the National Metal Congress
Cleveland, Ohio
October 16-20



It's Easy When You Know How



To the novice, this resistance welding machine would look terrifyingly complicated. But it's easily operated by those who know how. So, too, with the larger problems of resistance welding: they're hard to the uninitiated, easy to the experienced.

Mallory has exactly this kind of resistance welding "know how". For one thing, years of experience have enabled it to develop a complete, versatile line of tips and holders that are precisely the answer to many spot welding difficulties.

Mallory tips, made of Elkaloy* A, Mallory 3† and other special Mallory alloys, are designed to operate for long periods without excess wear or "mushrooming" out of shape . . . have unusual mechanical strength and electrical conductivity. They are suitable for spot welding an amazingly large number of metals, including mild, carbon, alloy and plated steels, galvanized iron and many non-ferrous metals including aluminum.

Mallory water-cooled tip holders, made of similar special alloys, offer comparable features of superiority. A constant flow of cooling liquid through holder and tip maintains low operating temperature . . . promotes longer tip life. They have an ingenious device that permits tips to be removed quickly—by a slight hammer blow at the opposite end. They are available in straight, offset and universal types—in standard and heavy-duty design.

For further information about Mallory tips and holders, send today for our Resistance Welding tip and holder Catalog. This same booklet will familiarize you with other Mallory parts and products—seam welding wheels, shafts and bushings, flash, butt and projection welding dies.

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

**Registered trademark of P. R. Mallory & Co., Inc., for welding electrode material.*

†Registered trademark of P. R. Mallory & Co., Inc., for copper alloys.

P R MALLORY & CO Inc
MALLORY
Standardized Resistance Welding Electrodes

44 Pages of "KNOW HOW"...ideas that are helping speed production in leading aircraft and accessory plants

FREE

Covers all essential phases of production cleaning and related operations required in aircraft and accessory manufacture, including techniques for removal of oxide films, rust, scale. See partial list of contents below.

This 44-page "Know-How" Oakite Manual . . . newly enlarged, SECOND edition . . . is based on the successful experience of leading aviation and parts manufacturers . . . contains many helpful suggestions for expediting more than 50 different types of work and operations. It is YOURS . . . FREE for the asking!

OAKITE CLEANING and SURFACE PREPARATION

Cleaning Aluminum Before Anodizing
Removing Anodizing Film from Rejects
Preparing Aluminum and Aluminum Alloys for Spot Welding
Water Treatment in Paint Spray Booths
Removing Heat Treat Film from Aluminum
Stripping Primer from Rejected Aluminum Parts
Cleaning Aluminum before Painting
Cleaning before Pickling
Preparing Ferrous Metals for Organic Finishes
Removing Scale from Heat-Treated Ferrous Parts
Cleaning before Cadmium Plating
Cleaning Gas Welding and Flame Cutting Tips
Cleaning Magnesium Alloy Parts
Preventing Adhesion of Weld Spatter
Producing Mat or Etched Finish on Aluminum
Producing Rust Protective Film between Operations

OAKITE PRODUCTS, INC.
General Offices:
24 Thames Street
New York 6, N. Y.

USE THIS HANDY COUPON

Merely fill in to request your FREE copy of this 44-page manual. Hand it to your secretary to put in the next outgoing mail.

OAKITE PRODUCTS, INC.
General Offices: 24 Thames Street, New York 6, N. Y.

Since there is no obligation, please send me my FREE copy of "Oakite Cleaning Materials and Methods in the Aviation Industry."

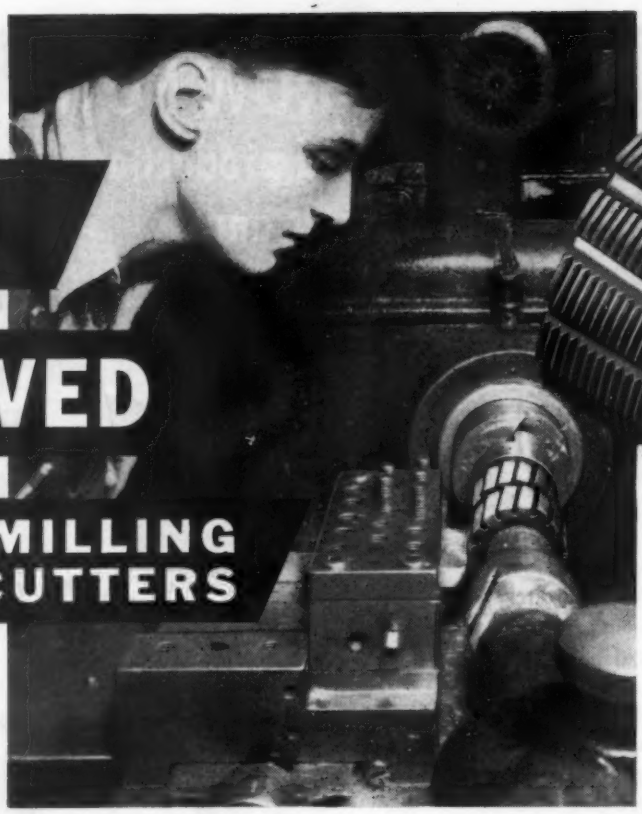
COMPANY.....

ADDRESS.....

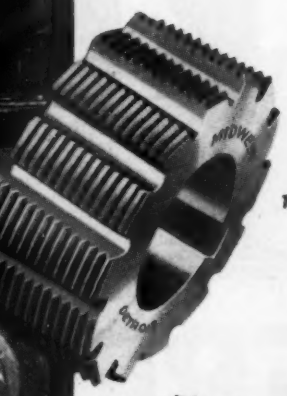
CITY, STATE.....

MARK REPLY ATTENTION.....

FORM RELIEVED THREAD MILLING CUTTERS



Putting Form Back-Off on Shell Type Thread Milling Cutter in Midwest Form-Relieving Department



Shell Type Thread Milling Cutter

Shank Type Thread Milling Cutter

MIDWEST Multiple Thread Milling Cutters are a type of form relieved cutters designed and made to produce in large quantities, speedily and economically, parts requiring short outside or inside threads.

The rows of teeth on these multiple cutters run around the cutter in a true circular pattern. Unlike the teeth in a hob, the rows do not travel progressively, i.e., "in a lead". It is this feature that especially marks the difference between multiple thread milling cutters and hobs. Since multiple thread milling cutters are *not* made with a lead, they should not be designated "Thread Hobs".

Midwest Shell or Arbor Type Thread Mills are the type most widely used since they are used essentially for external work. However, in many cases when the diameter permits, they can be used for internal operations.

Midwest Shank Type Thread Mills are used essentially for internal work when the cutter cannot be carried by an arbor. In many cases, however, they can be used on external work.

Spiral gashed cutters are recommended for most work. They produce a shearing action and continuous cutting from flute to flute. This tends to eliminate chatter, vibration, and provides smooth even surfaces and finish. When sharpening these cutters, correct spiral gash should be maintained or thread forms will distort. Free-hand sharpening should be avoided. Sharpening should be mechanically controlled to preserve original radial or rake teeth and spiral gashes.

Midwest has been designing and manufacturing all types of Precision Metal Cutting Tools for more than 33 years. This experience can help you hurdle production problems. Send us your inquiries; they will be carefully analyzed.

Do you have handy a copy of Midwest's 200 page illustrated Catalog No. 17 of cutting tool data? If not, ask for one on your company's letterhead.

MIDWEST TOOL & MFG. CO.

MILLING CUTTERS • SLEEVES • COUNTERBORES • END MILLS • REAMERS • SPECIAL TOOLS • FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

2352 WEST JEFFERSON AVENUE • DETROIT 16, MICHIGAN

First Aid for Ordnance

We salute the Unsung Heroes of Army Ordnance.

Machines of War wounded in combat can often be salvaged to fight again.

Each tank, each gun, each truck put back in service gives our offensive that much more punch . . . makes it possible to attack the enemy in more places.

Many times under fire while they work, Ordnance Field Units perform miracles of repair and restoration. Without thought of their personal safety, they fight the battle of First Aid for Ordnance.

Yes, we salute these gallant Time Savers . . . Materiel Savers . . . LIFE Savers!

Back the Attack with War Bonds

QUALITY TOOL & DIE CO.

Manufacturers of "Quality" Products

401-15 NORTH NOBLE STREET, INDIANAPOLIS 2, INDIANA

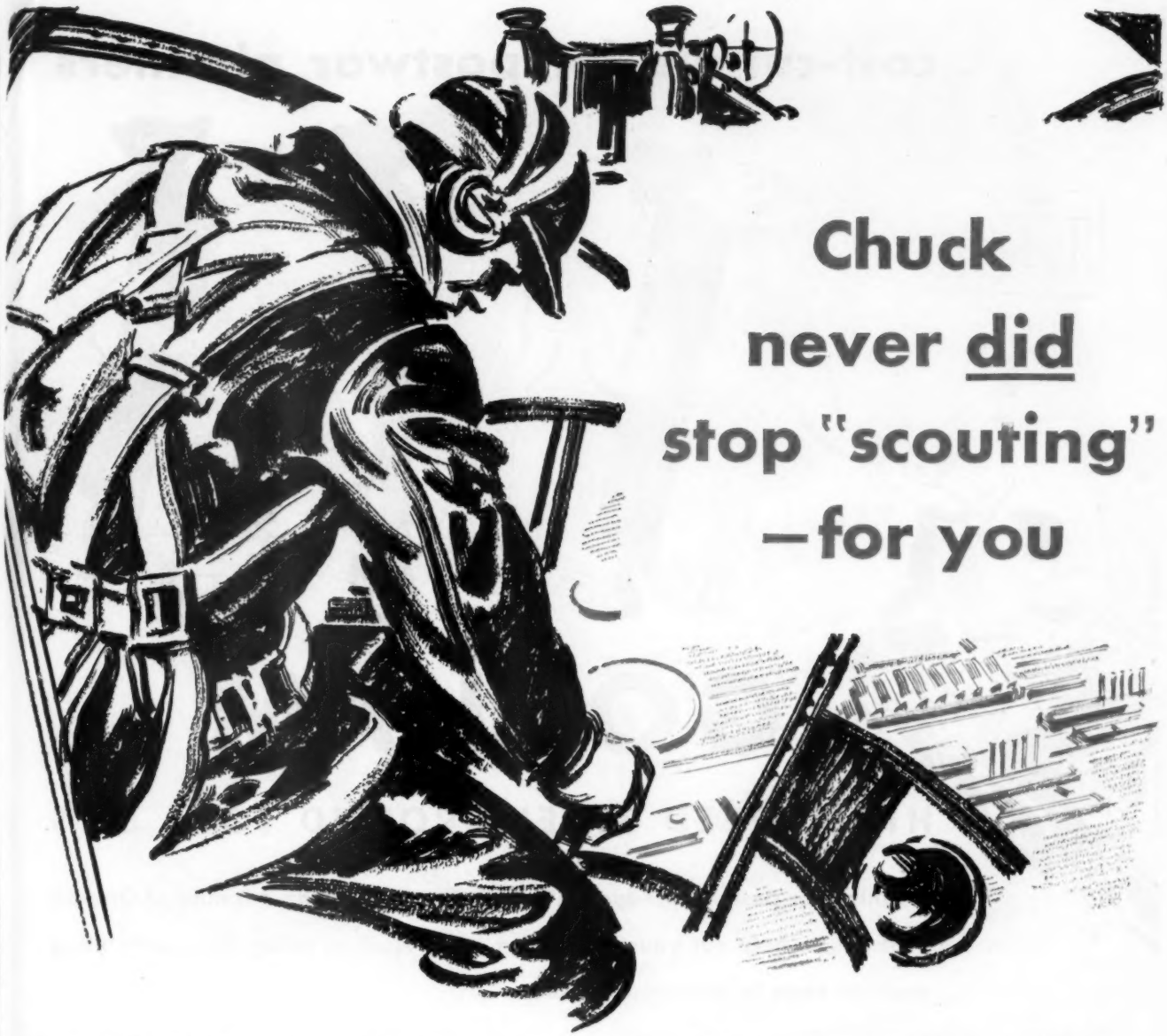
Gets into tight spots!

LOOK at that O.D., and you'll know why Apex stud setters get into hard-to-reach places with such ease and precision—even in the hands of semi-skilled workers. These simple, trim, clean-cut stud setters have small body diameters for their capacities. They are extremely easy to adjust for length of thread on stud and maintain proper adjustment in service. Simple design plus ample ruggedness and toughness make them fine tools for either hand or power applications. Four different sizes will set studs up to 1¼". You can get them with Morse taper, hexagon, T-handle and male or female square drive shanks, or combination T-handle with female square for use with a torque wrench. Write for Bulletin No. 101 for all the facts.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Tools for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.



Chuck never did stop "scouting" —for you

IN civilian life Chuck worked hard for your Industrial Supply Distributor◆. Perhaps you didn't know it then—but many a time it was his hard, persistent scouting for scarce materials and supplies that helped you to keep your production going.

Then Chuck put on the Uniform—but he never did stop scouting for you. Today he is up there in the sky, but when it's over he will be back with your Industrial Supply Distributor —with new ideas for helping you still more.

Give your Distributor every opportunity to help you. Particularly nowadays, channel every order you possibly can through him instead of sending direct to the factory. Twenty orders to the Distributor can be cleared in *one* order to the factory—will be delivered in most cases from stock with less paper work and less congestion on overcrowded rail and trucking facilities.

For your own and *everybody's* benefit—

Telephone your ◆I◆S◆D◆ FIRST!

◆C◆

ARMY NAVY

ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6615 SECOND BLVD., DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4

. . cost-cutters for postwar planners

GORHAM

HIGH SPEED STEEL GROUND TOOL BITS

Planning for postwar production? . . . Call on the Gorham family of Ground Tool Bits to help cut your production costs—just as today they are cutting wartime costs in thousands of shops . . .

The Gorham family includes *three* distinctive members—all "experience-tested"—each scientifically made of the correct cutting materials to do *specific jobs* . . . Try them . . . Find out for yourself how to get *more* cuts per bit, *more* cuts between grinds . . . Let's talk it over.

3 DISTINCTIVE CUTTING MATERIALS

GORHAM STANDARD
For the commercial field

GORHAM M-40-B
For heavy cuts in hard material

GORHAM GORMET
For more abrasive materials

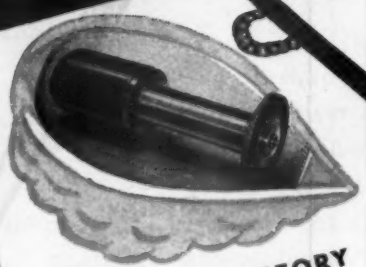
GORHAM TOOL COMPANY

14400 WOODROW WILSON AVENUE

DETROIT 3, MICHIGAN

NOTICE!

Replace worn out 6" x 18" Surface Grinder Spindles with this POPE SEALED MOTORIZED UNIT



HERE'S THE STORY IN A NUTSHELL

This POPE Sealed Motorized Unit has a full 1 H. P. G-E motor *sealed-in* to run at peak efficiency, without attention, indefinitely.

The extra large SKF Super-Precision, Double Row roller bearings are sealed in, too. No worry about lubrication.

The Spindle also operates vertically or at any angle. Use it for other applications as well as for surface grinders.

When every one of your 6" x 18" surface grinders is equipped with this new and better Spindle you'll be getting *finer finishes* and *more production.*

Pope precision craftsmanship combines *sealed-in* G-E motor, SKF Super-Precision, Double Row roller bearings, massive construction and closer manufacturing tolerances to produce superior surface finishes and to save time by roughing off surplus metal fast, whenever necessary.

That is why we say—"*Replace Worn Out Surface Grinder Spindles By This POPE Sealed Motorized Unit.*"

Tell us what grinders you're operating and we'll give you the replacement estimates.

REG. U. S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

Grobet
THE COMPLETE LINE

HAND CUT & GROUND CUT
ROTARY FILES
ARE BIG SELLERS

High speed Steel Rotary Files, in shape, size and coarseness of cut for every industrial purpose . . . for work on steel, aluminum, magnesium, wood, rubber, plastics, etc.

Diesinker's Burs,
Tube Burring Cutters
Chatterless Countersinks, Etc.

Write for illustrated catalog R the most complete of its kind.

GROBET FILE CO. of AMERICA
421 Canal Street 1812 1943 New York, N. Y.
F. L. GROBET
IMPORTERS OF GROBET SWISS FILES MFRS. OF GROBET ROTARY FILES

GROBET
SWISS FILES
Since 1812

OVER 500 SHAPES AND SIZES

You will want this complete catalog of some 5,000 different sizes, shapes, and cuts of the Original Precision Made GROBET SWISS FILES made of chrome steel for higher cutting speed and durability.

ASK FOR CATALOG BF, also request catalog BM of files and saws for filing machines.

GROBET FILE CO. OF AMERICA
421 Canal Street New York 13, N. Y.

IMMEDIATE
DELIVERY

No. 1 to 60
New High Speed
Long Length

DRILLS

No. by Gage	Length	Our Price Net Each
1 to 10	6¼	$ .75
11 to 20	5¾	.75
21 to 30	5⅜	.75
31 to 40	5¼	.75
41 to 50	4½	.75
51 to 60	4¼	.75

If you buy 60 drills or more — 20% discount

VICTOR
MACHINERY EXCHANGE
INC.
251 CENTER STREET
NEW YORK N. Y.

● For many years Surface Combustion Industrial Furnace Engineers have been making heat treating history through the development and application of prepared atmospheres to established processes such as carburizing, hardening, normalizing, annealing, forging, etc. Today RX, DX, CG, NX and Char-Mo Gases are standard with metal processing and working industries.

During the past year announcements were made from the Surface Combustion Development Laboratory, of new advancements in the Science of Gas Chemistry and Heat Treating. To date these have included—

***Bright Gas Quenching, and Gas Pickling of Cold Rolled Steel**

The application of Gas Chemistry to Heat Treating presents possibilities of tremendous importance to the metal working industry. The approach is basic—and, with a background of years of continuous heat treating research, Surface Combustion is an ideal reference source for your heat treating problems—*now and for the future.*

The Heat Treater's Helping Hand

'Surface'

SURFACE COMBUSTION • TOLEDO 1, OHIO

Standard and Special Industrial Furnace Equipment for: Forging, Normalizing, Annealing, Hardening, Drawing, Carburizing, Nitriding and Heating. Special Atmosphere Generators. *Write for bulletins.*

YESTERDAY'S PIONEER • • • TODAY'S LEADER

MORE "MILES PER POUND"

WELDON cutting tools permit higher speeds and faster feeds with longer tool life. *They give you more miles of dependable cutting performance per pound of tool.*

This is especially true of WELDON Double-End End Mills* which give you double the service for less than the cost of two single-end end mills of equal size. They save production time, too, because when you want to change the mill, you only need to turn it end for end.

**WELDON originated this type of end mill.*

Write for Catalog 8-B

THE WELDON TOOL CO. Cleveland 4, Ohio

3000 WOODHILL ROAD

WHALE BRAND HACK SAW BLADES

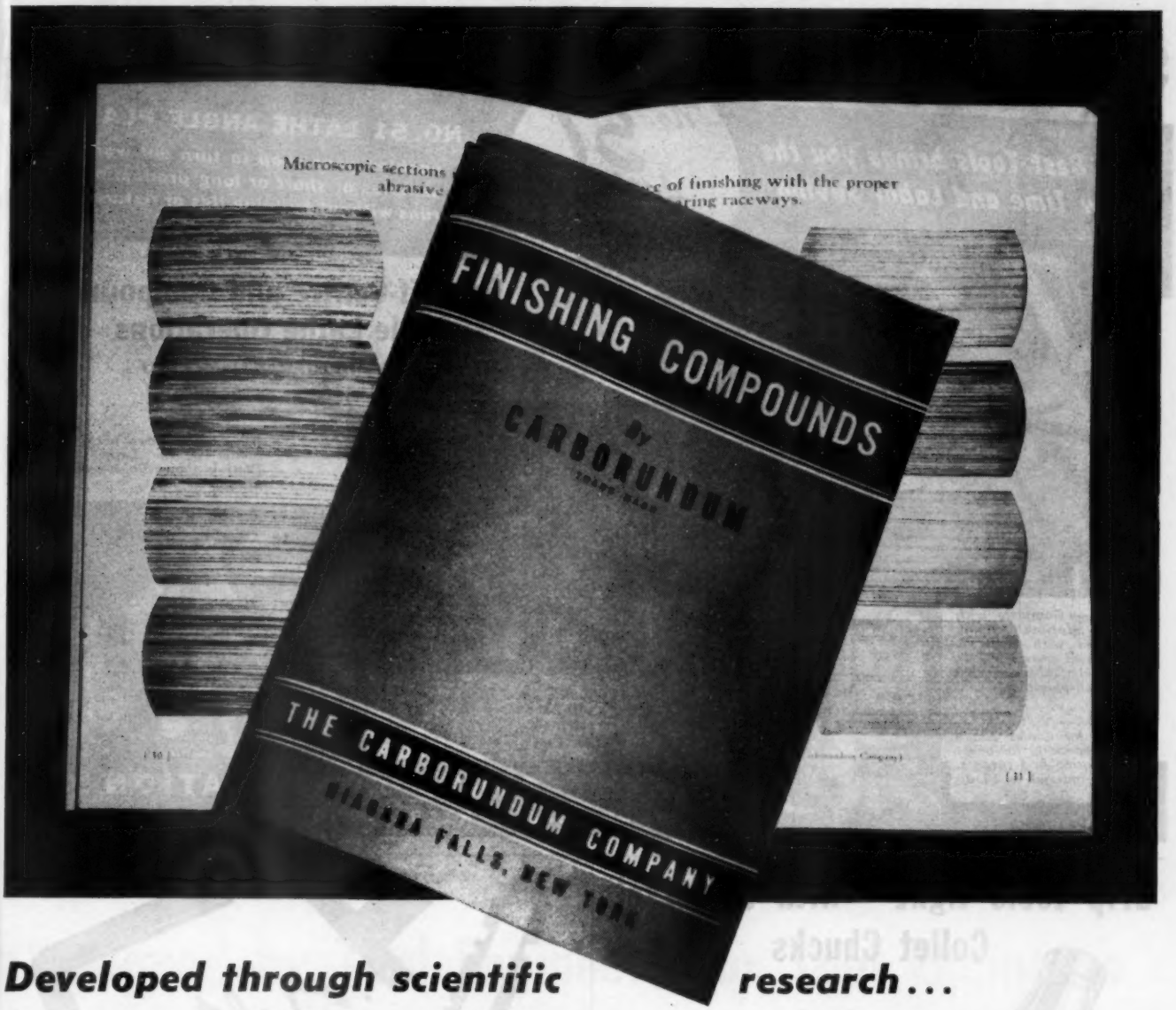
Here's the original, time-tested HY-FLEX BLADE . . . scientifically heat treated to add the toughness that gives these blades their outstanding performance. They are gauged and checked throughout every step of their manufacture and given a stiff bending pounds test before you get them for use. HY-FLEX meets today's demand for a medium priced blade which is extremely flexible, yet has the toughness that assures long service life.

Here's a Whale of a Blade of a special analysis molybdenum, high speed steel that gives unusual cutting service. Can be used at the same cutting speeds as tungsten and deliver practically equal performance. If you want outstanding results on stubborn cutting jobs, ask your mill supply house for WHALE BRAND HY-FLEX and MO-HY BLADES and you'll get it.

Get to know the satisfaction in WHALE BRAND HACK SAW BLADES and FRAMES • BAND SAWS • COPING SAW FRAMES and BLADES • SCREW DRIVERS • HAND DRILLS. Ask for the catalog that describes these and other good FORSBERG TOOLS.

Forsberg

• MFG. CO., BRIDGEPORT, CONN., U.S.A.



Developed through scientific research . . .

FINISHING COMPOUNDS BY CARBORUNDUM

There was a time when the use of lapping mixes was pretty much a hit or miss proposition. The preparation of mixes was the result of individual judgment—there were no scientific methods used in the proper compounding of abrasive grain with oil or other carrier media.

But now Carborundum research has substituted science for guess work. Today, finishing compounds by Carborundum are the result of a close scientific study of the proper combining or mixing of abrasive grain and carrier—the development of carriers for specific finishing applications—the accurate grading of abrasive grain—the correct type of abrasive.

These compounds are produced in various grades to meet all conditions. Grit ranges are from 60 down to 1,000, the extremely fine powders being produced under microscopic control.

They are made with four types of abrasives—Carborundum Brand Silicon Carbide, Aloxite Brand Aluminum Oxide, the natural abrasive garnet and the diamond.

For complete details regarding various grades—correct application and lapping procedure send coupon today for new free booklet "Finishing Compounds by Carborundum".

The Carborundum Company,
Niagara Falls, N. Y.

The Carborundum Company,
Niagara Falls, N. Y., Dept. AM.
Please send my free copy of "Finishing Compounds by Carborundum":

Name .....
Title .....
Company .....
Address .....
State .....

Abrasive Products by CARBORUNDUM

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Buffalo, Pittsburgh, Cincinnati, St. Louis, Grand Rapids
(Carborundum and Aloxite are registered trade marks of and indicate manufacture by The Carborundum Company)

STOP making expensive jigs for every special lathe job

How Best Tools brings you the New Time and Labor Saving

No. 51 Lathe Angle Plate

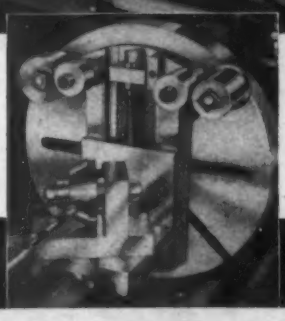
NO. 51 LATHE ANGLE PLATE

enables your shop to turn out work samples or short or long production runs without building jigs or fixtures

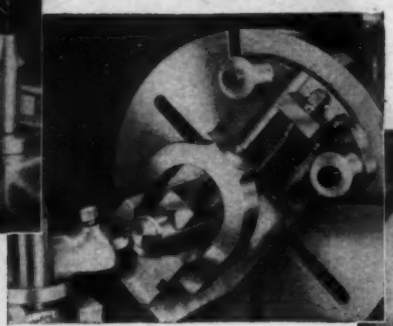
For Off-Centre and Compound Angle Lathe Operations

Write for Illustrated Booklet HJ

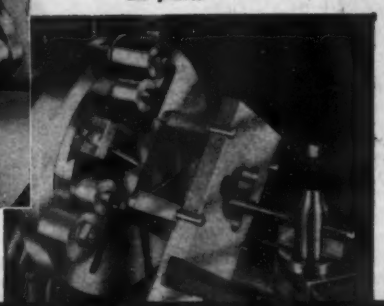
No. 51 — Complete with straight adjustable clamp. Equipped with centering gauge with provisions for counter-balances. Shown boring offset radius.



No. 51-A—Multi-use accessory for Lathe Angle Plate, especially for offset angle boring and turning. Can be indexed to 12 divisions.



No. 51-B—Lathe angle plate is shown with accessory B turning an eccentric.



No. 51-C—Shown with work holder C, the Lathe Angle Plate is shown finish-boring a die plate.

BEST TOOLS CORPORATION

ROCKVILLE CENTER, LONG ISLAND, N. Y.

Grip tools tight — with Universal Collet Chucks

Universal Collet Chuck with National Milling Machine Taper Shank. Also available with B & S, Morse and Straight Shank.

Universal Collet Chucks grip tools as strong as solid steel. Automatic release spring and allowance for tool feed-out. Handy wrench grip. Ground threads and reduced locking effort. Write for catalog.

ARMY E NAVY

Army-Navy "E" Flag Two Stars

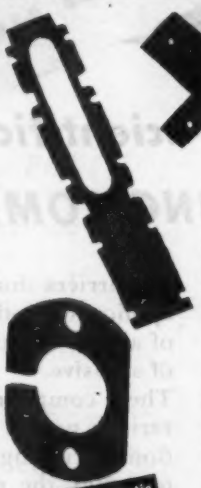
Fighter Plane Given by employees

20%

20% Employees Bond deductions

UNIVERSAL ENGINEERING CO.

FRANKENMUTH, MICHIGAN



Acadia Synthetic Division, Western Felt Works. Processors Synthetic Rubber. Sheets, Extrusions, Molded Parts.

Felt

CAN DO THIS FOR *Your Machinery*

- EXCLUDE DIRT, GRIT AND DUST
- RETAIN LUBRICANTS
- CUSHION SHOCK
- ACT AS ELECTRICAL INSULATION
- ACT AS THERMACOUSTIC INSULATION
- REDUCE WEIGHT
- ISOLATE VIBRATION
- MAINTAIN TEMPERATURE
- WICK OR FEED OIL
- FILTER FLUIDS

Western produces felt to take full advantage of its special properties: resiliency, flexibility, compressibility, resistance to heat, age, alcohol, etc. Western engineers are ready to help you on any problem involving the possible use of felt. Call upon them at any time.

WESTERN FELT WORKS, 4035-4117 Ogden Ave., Chicago 23, Ill.

Branch Offices in All Principal Cities

WESTERN *Felt*

Largest Independent Manufacturers and Cutters of Wool, Hair and Jute Felts

STELLITE CAST ALLOY GAGES BY WOODWORTH. A revolutionary advancement in gaging. They outwear steel 5 to 15 times, are non-corrodible and non-magnetic, have low co-efficient of friction and low affinity for other materials. Stellite's co-efficient of expansion is close to steel. Write for folder No. 44-S.
Precision Tools
BY WOODWORTH
SPEED UP PRODUCTION AND REDUCE COSTS with Limitrol. The Woodworth Limitrol Gage checks errors involving pitch diameter, lead, taper, angle, out-of-roundness; it eliminates "feel," and reduces scrap. Save time and gain accuracy with Limitrol. Write for folder No. 44-L.
THE WOODWORTH ADJUSTABLE CLAMPING JIG. A new and different designed fixture. Instantaneous positive clamping action. Mechanically simple, few moving parts, rugged construction. Adaptable. Quickly changed to right or left hand. Low maintenance cost, fully sealed-in lubrication. Minimum wear. Wide range of sizes. Prompt deliveries. Write for quotations and catalog.

Designed by Tool Engineers for Tool Engineers

The N. A. Woodworth Company is an organization of tool engineers and craftsmen dedicated to creating and producing the ultimate in precision tools . . . backed by years of training and experience plus their most modern metallurgical laboratories and experimental departments. Woodworth tool engineers design and produce tools of accuracy and long life that reduce production costs.

It was the metallurgists and tool engineers of the N. A. Woodworth Company, collaborating with the Stellite Company, who developed the now famous Stellite Cast Alloy for the manufacture of gages.

Another great achievement is the Limitrol Gage with its wide range of applications and possibilities.

Now the new Woodworth Adjustable Clamping Jig joins the *WOODWORTH FAMILY*, which has done so much to increase production and reduce costs for industry.

These contributions to the Manufacturers of America, together with a reputation for reliable service, have established The N. A. Woodworth Company as a leader in the tool industry.

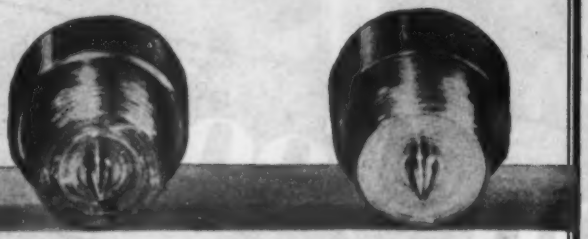
ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINED PARTS • HEAT TREATING • PLATING

before and after



How the right cutting fluid pays

FIRING PINS or cylinder barrels . . . shells or ship shafts . . . plants that make them use cutting fluids—most often *good* cutting fluids. Often, however, one cutting fluid is expected to fit every job. Usually it won't, for when the operation—speed, feed, tools or stock are changed a new set of conditions exist. That means the cutting fluid factor must be considered carefully on every job—and the ***right*** fluid determined for it. Such consideration pays well.

The stainless steel parts illustrated above are a good example. It is obvious from these unretouched illustrations that the piece on the right has the better finish on both face and thread. This improvement over the left hand piece was due solely to a change in cutting oil to the ***right*** oil for the job. And this ***right*** oil proved to cost 14c per gal. less, on the machine. In this case a simple blend of Stuart's Thred Kut 99 was the answer—but it might have been any other of several Stuart Products.

At the Metal Show . . .

the above parts and hundreds of others will be on display at the Stuart Oil exhibit — drop in.

The important fact is found in the experience and specialization of Stuart Oil Engineering in applying proved products . . . in helping you find the ***right*** cutting fluid with the least trouble and cost to you. Let a Stuart Oil Engineer work with you.

D.A. Stuart Oil CO.
LIMITED
2729 SOUTH TROY STREET
CHICAGO 23, ILLINOIS
ESTABLISHED 1865
Warehouses in Principal Metal-Working Centers

. . . faithfully serving industry in its mightiest war production!

As manufactured equipment and supplies flow from our factories to fighting men overseas, FIBREEN assures their arrival in first class condition . . . ready for action. This waterproof, scuff-proof, tear-resistant wrapping material successfully protects war supplies from dampness, wind, rain, sleet, ice and salt water.

Kraft paper, reenforced with crossed layers of steel-like sisal fibre embedded in water-proof adhesive, makes a low-cost protective wrapping of unmatched durability. These properties of FIBREEN, so vital to the war effort, are ones you need to protect your postwar goods enroute to your customers.

Use FIBREEN to Cut Postwar Shipping Costs!

Losses in transit were cut from 18% to less than 1% when a manufacturer of powdery material lined freight cars with FIBREEN before loading. A leather manufacturer substituted FIBREEN for crates, burlap and paper, and made a substantial saving in wrapping cost *and transportation charges.* Sheet steel, formerly loaded by hand into box cars, was wrapped in FIBREEN and loaded by crane into open cars! — *saved thousands of dollars!*

These and many other examples of SISALKRAFT research and engineering service warrant your consideration. SISALKRAFT leadership is the result of the unmatched performance of its products and nearly 25 years in the development of better wrapping methods with sisal-reenforced sheets.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Ask SISALKRAFT *to help cut your wrapping and shipping costs!*

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

Too Cold for Him . . .
But Just Right for

Threadwell COLD-TEMPER Taps

Threadwell *Cold-Temper* Taps give you an excellent opportunity to experience the benefits of the new deep-freeze treatment of cutting metals.

Threadwell *Cold-Temper* Taps, scientifically cold treated at *120° below zero*, produce more threads per tap and stand up better when cutting plastics and other abrasive materials. Threadwell *Cold-Temper* Taps are harder yet less brittle than high speed taps that have received only the usual heat treatment.

You can enjoy the superior performance of Threadwell *Cold-Temper* Taps at no extra cost. Why not try them next time you order taps? Your Threadwell Distributor stands ready to give you the same efficient *personal attention* service on Threadwell *Cold-Temper* Taps that he has successfully provided on Threadwell products throughout the emergency period.

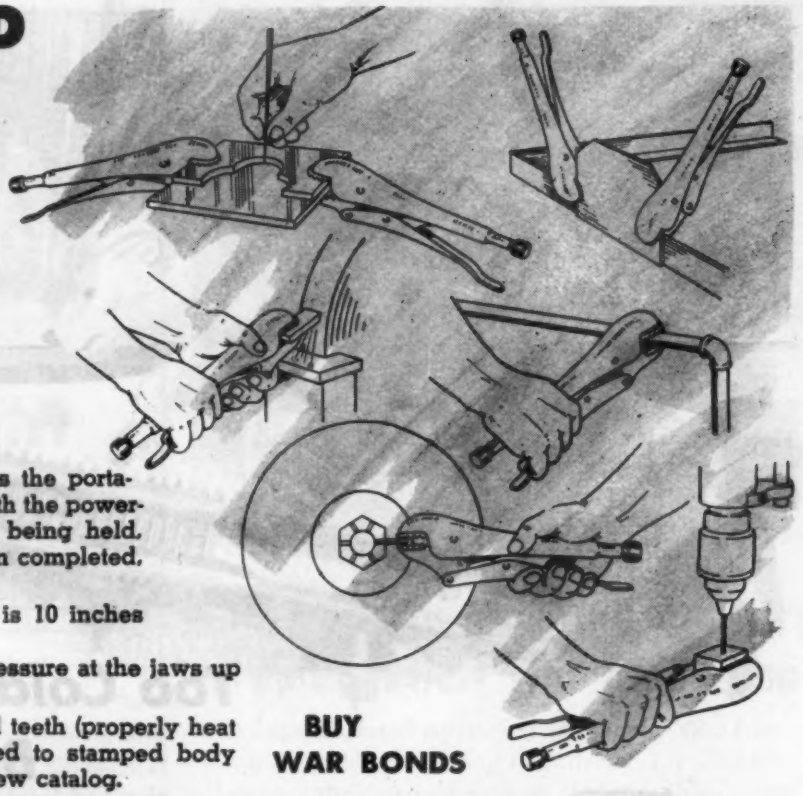
Be sure and ask him to furnish you with Threadwell *Cold-Temper* Taps.

DISTRIBUTORS IN LEADING INDUSTRIAL CENTERS THROUGHOUT AMERICA
EXPORT STOCKING DISTRIBUTORS
CANADA, Bridge Machinery Co., Montreal;
ENGLAND, Skylux Ltd., London and John H. Graham and Co., Inc.
THROUGHOUT THE WORLD

Threadwell
SINCE 1902
"TAPS OF DISTINCTION"

THREADWELL TAP AND DIE COMPANY · GREENFIELD, MASSACHUSETTS, U. S. A.

DO YOU NEED *A Handy Tool* THAT WILL DO THINGS LIKE THIS?



★ It's the new Vise-Wrench—that combines the portability and convenience of ordinary pliers with the powerful locking grip of a vise. While work is being held, both hands can be free for operations. When completed, work can be released instantly.

Known as Model VG-10, the Vise-Wrench is 10 inches long and weighs 18 ounces.

Normal hand grip can attain a clamping pressure at the jaws up to 1 ton.

Jaws are alloy steel forgings with machined teeth (properly heat treated for greatest wear resistance) welded to stamped body construction (also heat treated). Send for new catalog.

BUY WAR BONDS

BUY WAR BONDS

KNU-VISE INCORPORATED

2217 EIGHTH STREET, DETROIT 16, MICHIGAN
4328 SAN FERNANDO ROAD, GLENDALE, CAL.

CARD SPIRAL POINTED TAPS

for free, accurate thread cutting in deep holes

Designed for tapping deep through holes or blind holes drilled deeply enough for ship clearance at bottom of hole. Cutting is done by the first few threads milled at an angle. Chips are forced ahead of tap, preventing chips clogging in flutes, thereby increasing strength of tap and minimizing chances of breakage.

CARD SPIRAL POINTED TAPS assure free cutting, and fine quality threads. Furnished in carbon steel and high speed steel types. Fully described in Card Catalog, available promptly on request.

CARD TAPS ARE SOLD BY LEADING DEALERS EVERYWHERE

S. W. CARD MANUFACTURING CO.

Mansfield, Mass., U. S. A.
DIVISION OF UNION TWIST DRILL CO.

STORES: New York: 61 Reade St., Chicago: 11 S. Clinton St., Detroit: 6540 Antoine St., San Francisco: 121 Second St., Seattle: 568 First Avenue, South Los Angeles: 524 East Fourth Street

Back of our Trademark

Some of the Products of National Tool

Hobs,
Ground and Unground

★

Reamers

★

Counterbores

★

Gear Cutters

★

Milling Cutters

★

Herringbone Cutters

★

Gear Shaper Cutters

★

Slitting Saws

★

Special Tools

★

Broaches

★

Circular and Flat
Form Tools

★

National Tool is the largest company which devotes substantially its entire energies to production of special metal cutting tools.

★

National Tools are the shapers of progress

NATIONAL Tools CLEVELAND

Skill and Experience of master planners, engineers and workmen.

Finest Materials to ensure durable and dependable metal cutting tools.

Super-sensitive Machinery that has made National Tool Products famous for their

. . . *Precision*

Some of the Users of National Tools

Studebaker
Delco-Remy
Curtis Wright
General Electric
Wright Aeronautical
Cincinnati Milling Machine
Thompson Products, Inc.
Jack & Heintz, Inc.
Warner & Swasey
General Motors
Nash-Kelvinator
International Harvester
Chicago Gear Works
Frigidaire
Delco Products
Ford Motor
Buick Motor
Packard Motor
Continental Motors
Chevrolet
Cadillac Motor
Chrysler
Pontiac Motor
Hudson Motor
Heald Machine Company
American Locomotive
Caterpillar Tractor
R. G. LeTourneau, Inc.
Oliver Farm Equipment
Deere & Company
Ottumwa Iron Works
Youngstown Sheet & Tube
Sperry Gyroscope
Western Gear Works
Consolidated Vultee
S.K.F. Industries
Link Belt
Warner Gear
Spicer Manufacturing
D. O. James
Gleason Works
Detroit Gear Aircraft
Lufkin Foundry & Machine
Emsco Derr.ck & Equipment
Philadelphia Gear Works

Many other companies large and small.

NATIONAL TOOLS HAVE AN INTERNATIONAL REPUTATION

ARMY E NAVY

NATIONAL TOOL Co.

11200 MADISON AVENUE . CLEVELAND, OHIO

A PROVED SURFACE GRINDING "YARDSTICK"

If you are feeling your way on some surfacing operation . . . seeking a wheel of the grain, grade and structure that will do the job as your "spec" requires—use the 846 K-1-V Dayton as your "yardstick".

You may find, as so many have found, that it's exactly the wheel you are looking for. If not, you will find it at least surprisingly "close" to what you've got to have. So close, in fact, that selection of the correct wheel can then be made without further experimentation.

To save time, money, worry—put this 846 K-1-V Dayton to the test now. Made in a wide range of sizes—with trial wheels shipped from stock.

Write, wire or phone today.

SIMONDS WORDEN WHITE CO.
712 NEGLEY PLACE, DAYTON 7, OHIO

DAYTON GRINDING WHEELS

Insure Drilling Accuracy with Universal Drill Bushings

Universal Drill Bushings save valuable tool drills. Super finished bores insure accuracy and unexcelled wearing qualities. All standard sizes available. Write for catalog.

Army-Navy "E" Flag Two Stars

Fighter Plane Given by employees

20%

20% Employees Bond deductions

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

The "BURROFF"

for

DEBURRING and CHAMFERING HOLES IN FORK SHAPED PARTS

Write for Descriptive Folder and Prices

TOOL IMPROVEMENTS CO.
SEAFORD, N. Y.

Sales Agents

JOHN H. GRAHAM & CO. INC.
105 Duane Street **New York City, N. Y.**

Worn tools renewed by New-Tool Craftsmen

At Severance, worn dulled midget milling cutters are coming in—and renewed, resharpened and "Severited" cutters are going out—in an unprecedented volume.

The reason for the popularity of Severance regrinding is three fold:

1) Severance, originators and largest manufacturers of milling cutters, use the same experienced craftsmen in grinding worn tools as they use in the manufacture of new tools.

2) After being accurately reground, Severance further improves renewed tools by the exclusive "Severite" heat-treat process that gives additional hardness to the teeth and increases the tools cutting life from three to fives times.

3) There are six Severance plants strategically located in the United States to give you prompt, efficient regrinding service.

Check up, now, on your worn and dulled cutting tools. For best service, send them to the Severance plant nearest you for a factory regrinding job.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING • SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICH. • PLANTS IN LONG ISLAND CITY 1, N. Y.; DETROIT 2, MICH.; FORT WAYNE 8, IND.; CHICAGO 6, AND LOS ANGELES 21. IN CANADA: 60 FRONT ST., W., TORONTO, ONT.

Selected for SERVICE

Speed your output with Criterion Diamond Tools. The kind of service they give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

HERE'S WHY BOKUM BORING TOOLS Have Long Life...

CLEARANCES are not effected by repeated sharpenings.

Each tool will take thousands of sharpenings without causing its form to change.

The original form remains constant due to the angle of the cutting edge and the helical backed-off form of front of tool.

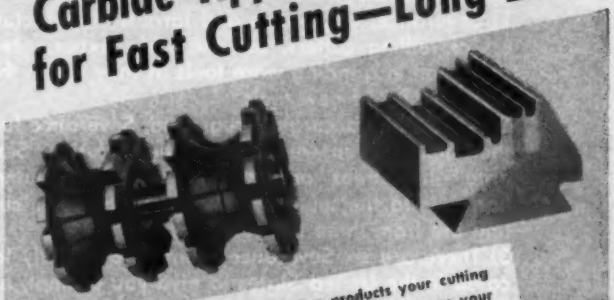
Thus, sharpenings being made on the line of radius, life of tool is equal to the number of sharpenings represented in its circumference.

The same unique design that characterizes this general boring tool (Style A) also distinguishes the two other types of Bokum Tools—Style B for facing and bottoming and Style C for internal threading.

For super High Speed Tools, ask for Catalog K-1139 and for Carbide Tipped K-398.

BOKUM TOOL CO.
14775 WILDEMERE AVE. • DETROIT 21, MICH.

Carbide-Tipped, or Hi-Speed for Fast Cutting—Long Life



As the basis of your precision products your cutting tools must be accurate and long wearing or your entire production will suffer. We invite your inquiries on CARBIDE-TIPPED or HI-SPEED cutting tools and promise you prompt estimates and attractive deliveries. Write for new illustrated bulletin No. 301, showing some of the types of tools we manufacture.

AMERICAN CUTTER & ENGINEERING CORP.
31745 Mound Road • • Warren, Michigan

A.C.E. SPECIAL CUTTING TOOLS

OH YES!

THIS NEW SAW

CUTS NON-FERROUS METALS

DoALL Buttress

THE NEW WIDE-SPACED HARD TOOTH SAW

Does faster, cleaner cutting of:

★ MANGANESE ★ ALUMINUM ★ ZINC

★ BRASS ★ COPPER ★ BRONZE

★ GRAY CAST IRON ★ PLASTICS ★ WOOD

First developed by DoALL engineers to help aircraft production over the hump, the DoALL Buttress Saw Blade is rapidly finding its way into plants everywhere for contour and straight-line cutting of extra-hard, porous, and every type of tough material that other saws can't handle.

The DoALL Buttress does the work in a fraction of the former time and fits any band sawing machine.

IMMEDIATE DELIVERY — Available in widths of 1/4", 1/2", 3/4" and 1" and various pitches at all DoALL Supply Points.

Visit the DoALL Exhibit at the Metal Show, Oct. 16 to 20, Cleveland Auditorium.

NO RE-SHARPENING

The DoALL Buttress Saw will last longer than ordinary saws, so it's economical to use until completely worn out — no work stoppage for re-sharpening — and then place a new saw on the machine.

DoALL

INDUSTRY'S NEW SET OF TOOLS

Send for Circular and Full Information

THE DoALL COMPANY, 201 N. Laurel Ave., Des Plaines, Ill.

Sales & Service Offices: Baltimore, Boston, Chicago, Cleveland, Denver, Detroit, Erie, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Orlando, Philadelphia, Pittsburgh, Rochester, Rockford, St. Louis, San Francisco, Seattle, Toledo, Tulsa, West Hartford.

Vitrified

Cuts longer between turns

Vitrified Grinding Wheels assure economy in high quantity production fine precision grinding because they cut longer between each wheel truing. Then, too, these long life, strong wheels require less redressing. They can also be depended on to eliminate gumming, glazing and heating.

All these advantages are available regardless of the grinding job, because there is a size, shape and type Vitrified Grinding Wheel for every grinding purpose. The completeness of the Vitrified line makes it possible for any shop to standardize on Vitrified Wheels. Our engineers will gladly study your grinding operations and point out the savings you can make through the use of Vitrified Wheels.

BORITE—for all kinds and classes of steel grinding.

CARBORITE — for all classes of cast iron, brass, bronze and aluminum grinding.

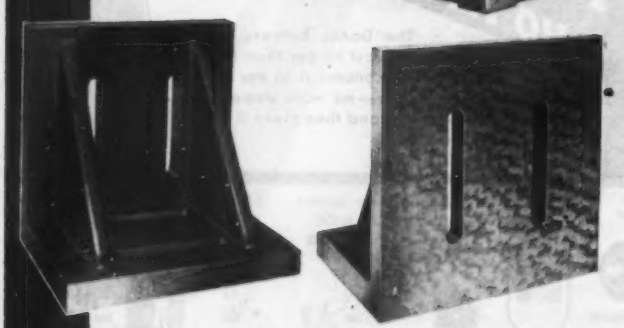
Also, Silicate, Shellac and Resinoid Bonded Wheels.

VITRIFIED

VITRIFIED WHEEL COMPANY

WESTFIELD MASS.

LOMBARD SURFACE AND ANGLE PLATES



VITAL FOR SUCCESSFUL INSPECTION

Rigid control of production methods assures unequaled precision in these Lombard inspection plates. Long life accuracy and resistance to machining stress comes from careful heat treating of the close-grain, semi-steel type iron and from the scientifically designed ribbing. Careful scraping assures finished accuracy.

THREE FINISHES AVAILABLE

MACHINE FINISH — an Excellent Commercial Finish
GROUND FINISH — for Closer Tolerances
HAND SCRAPED FINISH — Finest Finish — for Extreme Accuracy

Other Lombard Precision Equipment

SURFACE PLATES
LAPPING PLATES
GROUND BENCH PLATES
BOX PARALLELS
SOLID PARALLELS
STRAIGHT EDGES
HARDENED AND GROUND V BLOCKS

Send for Catalog of Lombard Precision Equipment

NAVY

LG

LOMBARD Governor CORPORATION

ASHLAND MASSACHUSETTS

Sales Office: 60 East 42nd Street, New York 17, N. Y.

Cutting oil *News* letter

Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs.

OCTOBER, 1944

Production jumps 350% with heavy-duty soluble oil.

Hot chips and steaming coolant indicated that all wasn't going well on a new job of milling 4140 steel castings in a Detroit plant. Several soluble oils and various mixes of them were tried. But overheating persisted. Cutters had to be reground on an average of every 70 pieces. The Standard Cutting Oil Specialist, who was called in, decided it was a job for a heavy-duty soluble oil. Stanicool HD was his suggestion. With it on the job, excessive steaming and hot chips were eliminated. Tool life jumped from 70 up to 90 pieces between regrinds—a 28% increase. But the real payoff came when, as a result of this increase, Stanicool HD was tried on a reaming operation. Parts produced went from 40 pieces to 180 pieces between tool grinds—a 350% jump.

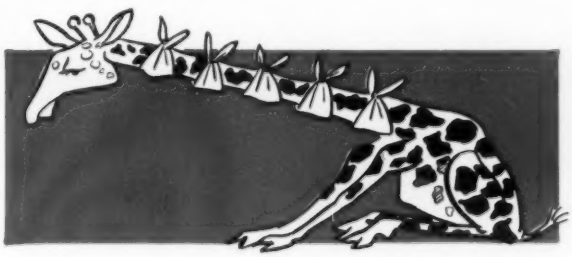
Heavy-duty soluble oil can be used where cutting oils do not provide sufficient cooling and conventional soluble oils will not do a satisfactory job from the standpoint of tool wear, finish, etc. Stanicool HD may be the answer to these in-between jobs in your plant.

Saves 4 to 5 taps a day.

Tap breakage in a threading operation on stainless steel was the principal complaint of an airplane parts maker. Also, threads weren't good and the time-consuming job of salvaging parts was a real production snag. Then one of the war-developed lines of Stanicut Cutting Oils was recommended by a Standard Cutting Oil Specialist—Stanicut 137 BCS. With it, tap breakage was eliminated—saving four to five taps a day. Production was stepped up 14% because of better threads.

Kerosene and cutting oil mix O.K. until . . .

The possibility of eliminating a messy mixing job and saving time were two reasons why an Illinois manufacturer agreed to try Stanicut 62 FC for machining aluminum castings. He had been using a mixture of kerosene and cutting oil. Stanicut 62 FC gave more than was expected. It eliminated mixing—saved time and trouble—it also improved tool life and finish on the castings. Stanicut 62 FC was developed by Standard Oil when the machining of aluminum became a vital part of war work.



Eliminates gum on 12-foot ways of grinder.

Like a sore throat on a giraffe, gummy deposits on 12-foot ways of grinders seemed to be a big problem to cure. The grinders in a Detroit plant were used for sharpening long cutter knives. The gummy deposits were evidently caused by the cooling fluid getting on the ways and combining with the lubricant used there. The deposits had to be removed with kerosene once a week and the machines did not operate smoothly. Stanolex No. 31 was the Standard Oil Lubrication Engineer's answer. When the ways were cleaned and Stanolex applied—it eliminated the trouble. Stanolex Oils contain a special compounding material which gives them greater oiliness and higher film strength. They are particularly recommended for ways and guides of machines which tend to chatter when straight mineral oils are used.

See a Standard Cutting Oil Engineer. He has many products like the Stanicut line which were developed for war-needed machining jobs. He has a wealth of experience in applying them—probably to jobs just like yours. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Gasoline Powers the Attack—Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

RICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION EN

LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATI

Not a minute of extra "record keeping"

MANY SYSTEMS for saving time and labor require so much clerical work and record keeping that the "cure" they offer is often worse than the "ill." This is not true of Standard's Coded Lubrication Service. Once installed, this system requires no record keeping. It automatically tells your oilers *where* lubricant is needed and *what* lubricant to use on every spot to be lubricated in your plant.

These three simple steps, described at right, show how easy it is to apply this system or adapt it to your present plan.

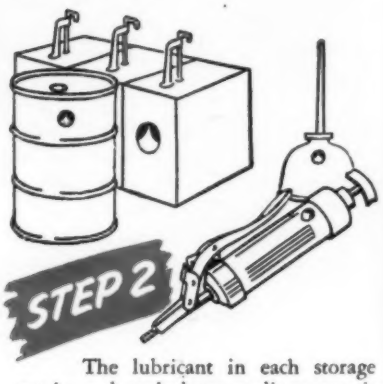
With this system installed, oiler crews simply fill their grease guns, oil cans, or other dispensing equipment with the right lubricant, by number, and apply it to the machines by number. In addition, if you feel that it is necessary to tell the oiler *how much* lubricant is needed, and *how often* to apply it, machine record cards are available on which this information can be entered. The most important problem, however, of getting the *right lubricant* in the *right place* every time is solved in the three simple steps outlined.

A Standard Oil Industrial Service Representative will be glad to show you samples of the decals and the lubrication chart. He will be glad to talk with you or your men in charge of lubrication about putting this system to work in your plant. Call the nearest Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago 80, Illinois, for a Representative. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

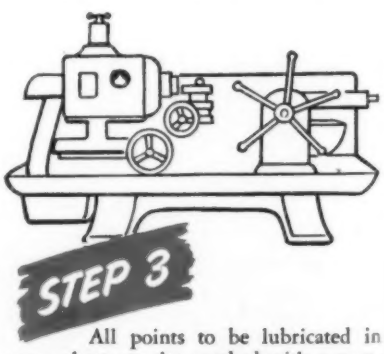
Gasoline Powers the Attack . . . Don't Waste a Drop!

How Standard Coded Lubrication Service is applied

Each lubricant used in your plant is assigned a number. These numbers are recorded on a lubrication chart—this is the only record making that is ever needed—and copies are kept in the oil room, purchasing department files, or wherever else they may be useful.



The lubricant in each storage container—barrel, drum or dispenser—is identified by the number assigned to it. Numbered decals, in two color combinations, are used for this purpose—another example of the simplicity of the system.



All points to be lubricated in your plant are also marked with a numbered decal indicating *what* lubricant is to be used, and *where* it is needed.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Even "Tom Thumb" Gets Precision Results

ON THIS ECCENTRIC SLEEVE

THE SMALLEST DUMORE PRECISION GRINDER DOES A MAN-SIZED JOB ON AIRCRAFT PARTS

We don't know what this piece is . . . couldn't tell you if we did, but it is very important for military aircraft. Important, too, is the precision with which it must be made. The diameter of the hole and the eccentricity must be held to .0004". This is well within the range of the Dumore No. 14, the baby of the Dumore family, which like all its big brothers, is designed and built for precision grinding to .0001".

Mounted on an engine lathe, equipped with a 4-jaw chuck, this No. 14 Dumore furnishes a striking example of the quickly set-up, low-cost, but accurate method thousands of plants are using for production grinding. From the smallest to the largest model, Dumore Grinders have stamina and endurance which give them a surprising capacity for "production-with-precision." Read the full details in the Dumore Catalog No. 42. Ask your distributor, or write direct to The Dumore Company, Tool Division, Dept. TK14, Racine, Wisconsin.

Have you a copy?
Get one without delay!

DUMORE

PRECISION AND OFF-HAND GRINDERS

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

Need Gages In a Hurry?

A carefully selected stock of standard thread plugs, class 2 and 3 fit, is ready for your use. These highest quality gages, made from specially heat-treated, high speed steel, are made to gage more holes. If your immediate thread gage needs are within the size range of 4-40 NF up to and including 1½-12 N, call, write, or phone us. Your order will receive prompt attention.

No matter what thread form you need ground, or the closeness of tolerance required, you can rely on Republic Gage to furnish you gages of highest excellence.

REPUBLIC GAGE
2228 FENKELL AVE. DETROIT 21, MICH.
PHONE UNiversity 1-0370

HERE'S YOUR ANSWER... RIEGER MULTIFACER

Change the insert bit in the Multifacer and you change the cut. Simply insert the right bit and you can spot face, counterbore, seat, or cut annular rings of the diameter and contour you want. Bits can be changed without tearing down the job. Multifacer is tough alloy steel properly heat treated and ground. Made in three sizes for cuts of 1" to 5" diameter. Pilot bushings available for different sized holes. Get all the facts about this tool of many uses.

Write for literature now.

THE RIEGER MFG. CO.
DEPT. AM-10, MIAMISBURG, OHIO

REPRESENTATIVES
Harry E. Hummer, 115 Montclair Avenue, Newark 4, New Jersey; Jack Brewer, 1151 S. Broadway, Los Angeles 15, California.

CRAFTS

GAGES AND TOOLS

ARTHUR A. CRAFTS COMPANY, INC.

Accuracy Huston Standards

603 Newbury Street *at Kenmore Sq.* BOSTON
DETROIT · CHICAGO

NICHOLSON EXPANDING MANDRELS CUT COSTS

Because they save time, promote precision. Set of 19 does the work of 193 solid arbors, for all bores from 1" to 7". Hardened tool steel. Singly or in sets. Prompt delivery.

Recognized as standard the world around.

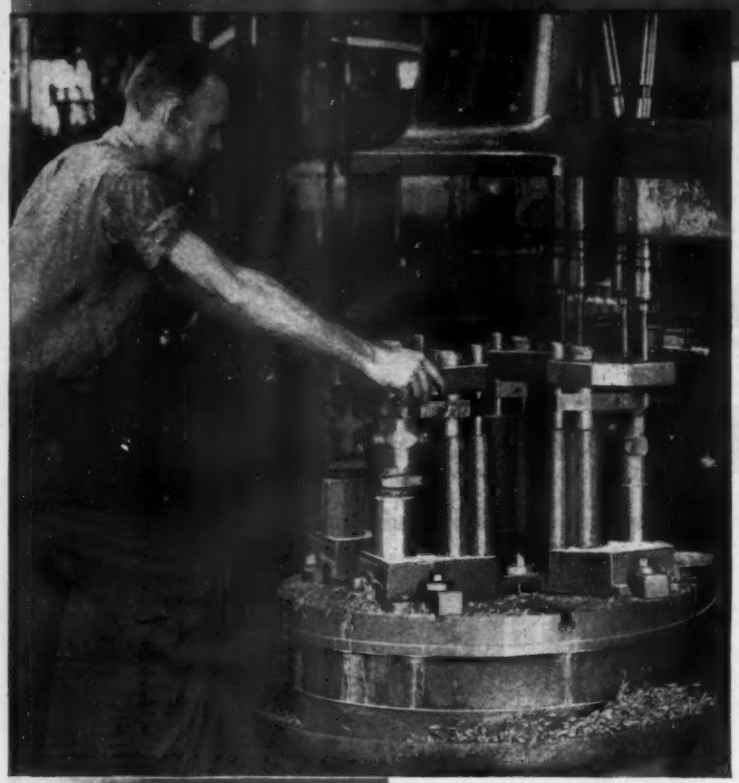
W. H. NICHOLSON & CO.
114 OREGON ST., WILKES-BARRE, PA.

WAR EFFICIENCY *that Carries Through to* PEACETIME PRODUCTION

SIEWEK

STANDARD RAPID CLAMPING DRILL JIGS

Spring or Rack-and-Pinion Types
Square or Oval Top Plates



Four E-2 Spring Type Siewek Jigs on a rotary table

● Now doing an outstanding job in war production, Siewek Standard Drill Jigs can be turned to new peacetime products easily. They are designed for conversion—the same change that makes each Siewek Drill Jig usable on a number of wartime products—the shift to another adapter and top plate.

Wide acceptance in war plants of these standard drill jigs is due to this feature, for it means a saving of time, material, labor and money. One Siewek Jig takes the place of dozens of special jigs, since simple adapters, as many as you need, fit the standard jig for a variety of jobs.

The shop using standard Siewek Rapid Clamping Drill Jigs will be in a position to keep up with sudden changes in product design. Having served so well on war production, these jigs immediately will be available to work on peacetime products when Victory is won.

Contact a Siewek representative in your territory, or write us for Catalog No. 50J describing 50 different sizes and types.

Type E Spring Jig

Type C-L Rack and Pinion Jig

Type H Horizontal Rack and Pinion Jig for 2-way Drilling

Type D Spring Jig

Type B Jr. Spring Jig

50 DIFFERENT SIZES AND TYPES

SIEWEK TOOL DIVISION
OF DOMESTIC INDUSTRIES, INC.
DETROIT (Ferndale Station) MICHIGAN
Representatives in Principal Cities

Designers and Builders of
SHEAR-CUT END MILLS

•

Affiliated with SIEWEK ENGINEERING DIVISION
a nationally known organization staffed with experienced engineers—Consulting, Processing, Designing and Fabricating
Chicago • Detroit • Springfield, Mass. • Hartford, Conn.

For Cramped Drilling...at Any Angle

STOW FLEXIBLE DRILL SHAFTS

A Stow Flexible Shaft that fits into your drill chuck is the answer to awkward, close-quarter drilling. The operator gets around obstructions easily, is relieved of weight and bulk. Fatigue is minimized, accuracy increased. STOW Flexible Shafts are available with 45 and 90° angle heads, or straight spindle, and in various lengths. Stow's 69 years' experience manufacturing flexible shafts is your guarantee of long life and top efficiency.

STOW FLEXIBLE SHAFT MOBILE POWER UNITS

For quicker grinding, sanding, drilling, buffing—take the tool to the job! Sturdily powered, ruggedly constructed. Write for Catalog 40 showing full range of models and attachments.

ARMY E NAVY

STOW MANUFACTURING CO.
29 Shear St. Binghamton, N.Y.

BROWNSKIN Scores Again!

A colorful folder showing how the Chrysler Corporation of Canada Ltd., protects their engines for export shipping has now been prepared. It tells the story of their use of A-19 Brownskin Grizzlybear to lick the problem of corrosion on overseas shipments.

Write today for your free copy of Folder BAM

Angier

ANGIER CORPORATION
CORROSION PREVENTIVE AND WATERPROOF PAPERS
FRAMINGHAM, MASSACHUSETTS

NATIONAL KEYSEATING MILLER

. . . the tool that converts drilling machines into key-seaters and saves time and money

- With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

The National Keyseating Miller mills, keyseats in one cut. It can be used on taper holes, offset holes, blind holes and for taper keys. Work clamping is unnecessary. We also manufacture oil-grooving millers.

Made in twenty-six different diameters from ½" to 3½". Several widths of cutters can be used in each size.

WRITE TODAY FOR OUR NEW CATALOG NO. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

Kutmore HIGH SPEED ADJUSTABLE HOLLOW-MILLS

SERVICE-PROVED for PERFORMANCE in Modern Production

"The Worth of Wirth Lies in accuracy, speed and economy."

The accuracy of KUTMORE HIGH SPEED ADJUSTABLE HOLLOW-MILLS is stressed because it can be quickly and convincingly proved on any job of any size. We therefore urge your immediate investigation of these high quality tools. Their use in your production will definitely assure time and money savings. Sturdiness and construction will enable you to operate your machines to full capacity with precision maintained to required close tolerances.

Kutmore Mills feature a two-way micrometer adjustment for interlocking and moving blades to cut smaller or larger diameters with absolute accuracy. Only a few Kutmore Tools are required to meet a wide cutting range. Regardless of size, continuous uniform performance is assured by a simple locking device by which blades are held securely.

Kutmore Hollow-Mills are available with straight or taper shanks. Blades can be quickly replaced from stock.

Put Kutmore Hollow-Mills to work and you'll immediately prove their worth. Descriptive literature is available promptly on request.

CARL WIRTH & SON 1623 CLINTON AVENUE, N. **ROCHESTER 5, N. Y.**

2 PORTABLE WASHING MACHINES

for batch cleaning of metal parts

The cleaning of metal parts in baskets, on racks, or individually, is ideally handled by these two new portable machines. Although each is designed for a special use, both machines have certain common advantages.

Both are used with any cleaning agent (alkaline, solvent emulsion, straight solvent). Any type of heat can be utilized. Both are portable—can be easily moved right up to the job, or from one job to another.

DIP AGITATING TYPE—Adds strong up and down mechanical agitation to the soaking action of the cleaning solution. Entire surface of load is "brushed" by flow of liquid as much as 30 times per minute, insuring uniform cleaning.

Used for cleaning, washing, paint-stripping, anti-rusting, rust-proofing, rinsing, chemical treatments, coating operations, etc.

SPRAY TYPE—Parts are spray-cleaned in one step as solution is continuously filtered and separated from oil carried off. A rapid cleaning process, requiring little solution, a small amount of heat and very short heating up time.

This machine is ideally adapted for use in similar operations where relatively small series of large, heavy parts are handled in process of fabrication, or before, and during, maintenance and repair. Smaller parts can also be handled in baskets, or on racks.

SEND FOR Your copy of new Bulletin 4E2 "Batch Cleaning in Portable Metal Washing Machines". Bulletin 4E1 describing other "OPTIMUS Machines for Every Metal Washing, Cleaning and Drying Problem" also available.

OPTIMUS

EQUIPMENT CO.

MATAWAN, NEW JERSEY

Engineers and Manufacturers of Washing, Rinsing, Pickling and Drying Equipment for Metal Parts

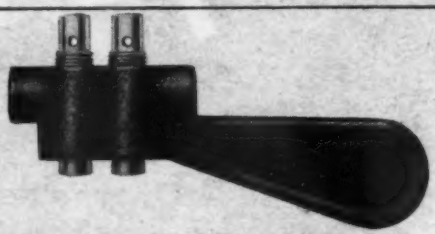
for Civilian Production

IMMEDIATE OR PROMPT DELIVERY NOW ON THREAD PLUG GAUGES

MASTER GAUGE CO.

2214 FENKELL AVE. DETROIT 21, MICH.
Phone: University 3-7676

EDDY ADJUSTABLE INSIDE (Go, No Go) GAGES



Replace: Plug Gages—Size Blocks—Telescoping Gages
Spring Calipers—Planer Gages—Keyway Gages
Sizes to gage from 1" to 12"

So easy to set that they are practical to use on a single piece—Can be sealed for the more numerous production jobs—Are rigid and cannot change as spring calipers do—Can be used to gage the taper and diameter of a tapered hole—Can be set to micrometers, ring gages, verniers or samples of work. *They also have many other uses — Send for further information.*

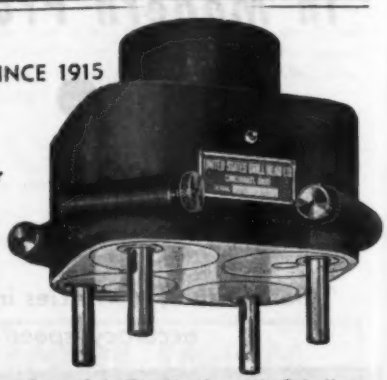
EDDY MANUFACTURING CO.

321 PINE STREET PAWTUCKET, R. I.

STANDARD **US** HEADS SINCE 1915

All Types of Fixed Center

DRILLING TAPPING & BORING HEADS

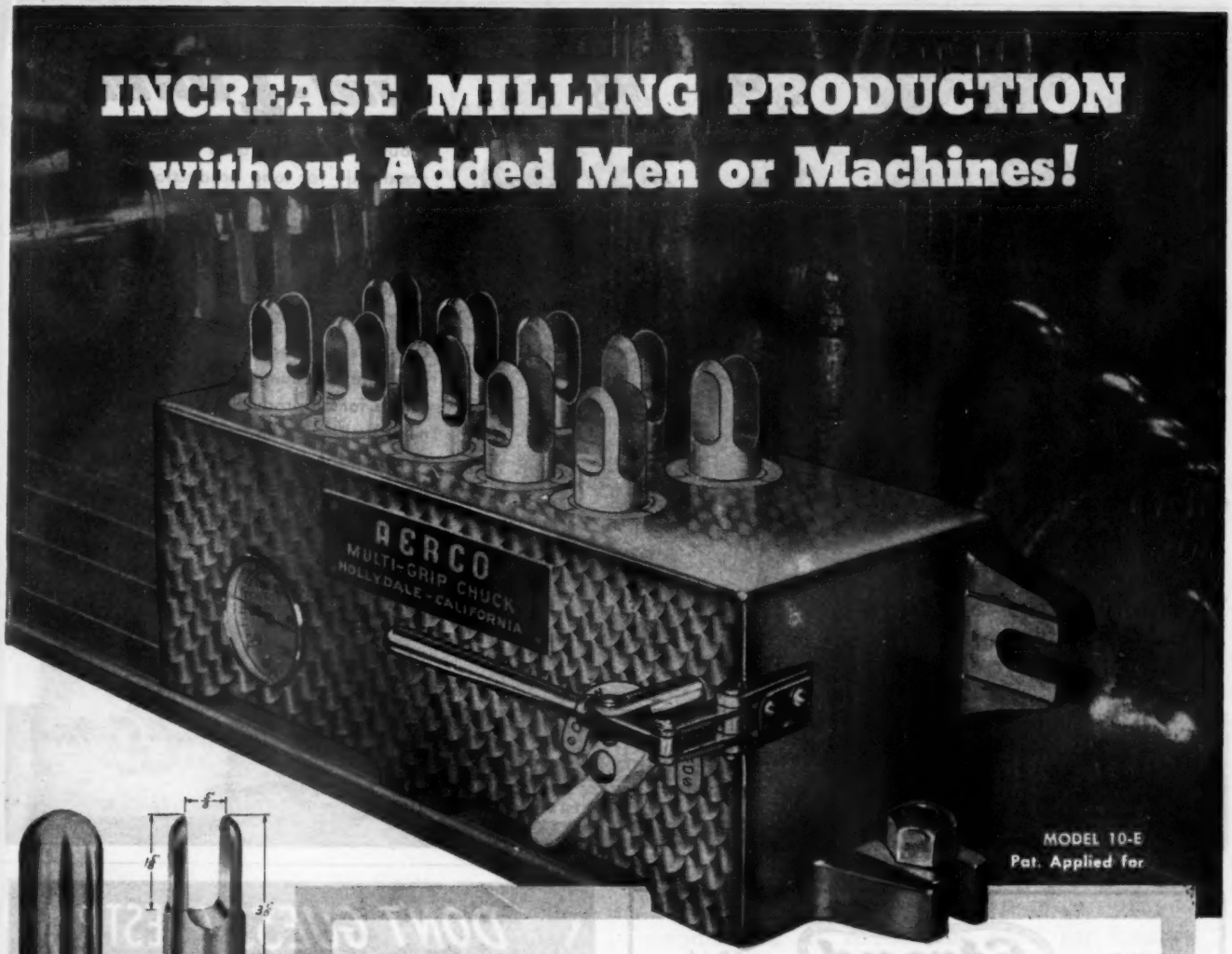


Four Spindle Head. All Spindles Adjustable for equally spaced holes.

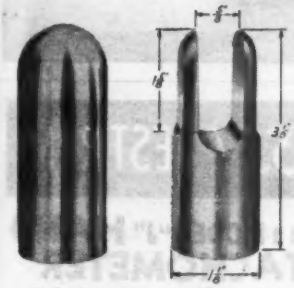
FIVE TYPES, 56 SIZES, ADJUSTABLE DRILL HEADS

UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO

INCREASE MILLING PRODUCTION without Added Men or Machines!



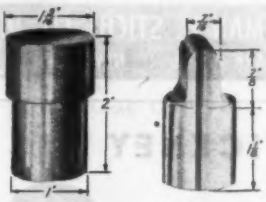
MODEL 10-E
Pat. Applied for



Before *After*

Aluminum Parts

These aluminum parts were milled upon the Aerco Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



Before *After*

Chrome Steel Parts

These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aerco Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aerco Multi-Grip Chuck show its versatility.

with the AERCO HYDRAULIC MULTI-GRIP CHUCK

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

Aerco Multi-Grip chucks may be used for both vertical and horizontal milling. Work is held rigidly in collets and cannot turn or be pulled out during milling operation, however clamping pressure is instantly releasable and self-opening collets can be quickly re-loaded.

Collet sizes range from ⅛" to 1¼" and are available in round, square or hexagon shapes.

Representatives Wanted in Principal Cities

MANUFACTURED EXCLUSIVELY BY

AERCO CORP.

HOLLYDALE, CALIFORNIA

ARMY E NAVY

WRITE FOR NEW FOLDER

CARBIDE TIPPED

Cal-Cutters:

TOOL CRIB NECESSITY

Cal-Cutters

should not be confused as *Special Tools* good only for long production runs or a single application—Cal-Cutters are standardized equipment for all machining operations on specific metals. If they reduce milling costs on one job, why not use the same time-saving tools for *all* operations?

Cal-Cutters' diversified design provides a complete selection of carbide tipped milling cutters for all production requirements. End mills, shell end mills, face mills, hyper mills, saws and special tools are built in many sizes for machining all metals.

Now—Cal-Cutter shell end mills with negative rake. See the 1300 series in our latest catalog, No. 383-3, shows most up-to-date designs and specifications. Why not write for your free copy today?

MACHINERY MANUFACTURING COMPANY

3415 EAST 57th STREET • LOS ANGELES 11, CALIFORNIA

Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS

1905 **Strand** 1944

STRAND FLEXIBLE SHAFT MACHINES

Used Throughout the Nation

High Quality Only

Vertical and Horizontal

⅛ to 3 H.P.

Attachments for Hundreds of Operations

Rotary Files
Ground Cutters

Send for Catalog

N. A. STRAND CO.

500 No. WOLCOTT AVE., CHICAGO 40, ILL.

DON'T GUESS! TEST R.P.M.

With a MODEL "J" HAND TACHOMETER

Triple Range:
300— 1200 R.P.M.
1000— 4000 R.P.M.
3000—12000 R.P.M.

RUGGED-RELIABLE-CONTINUOUSLY INDICATING TYPE

WRITE FOR BULLETIN #706

HERMAN H. STICHT CO. INC.
27 PARK PLACE NEW YORK, N. Y.

RANDALL & STICKNEY

Universal Gauge

for rigid inspection of a wide range of parts . . .

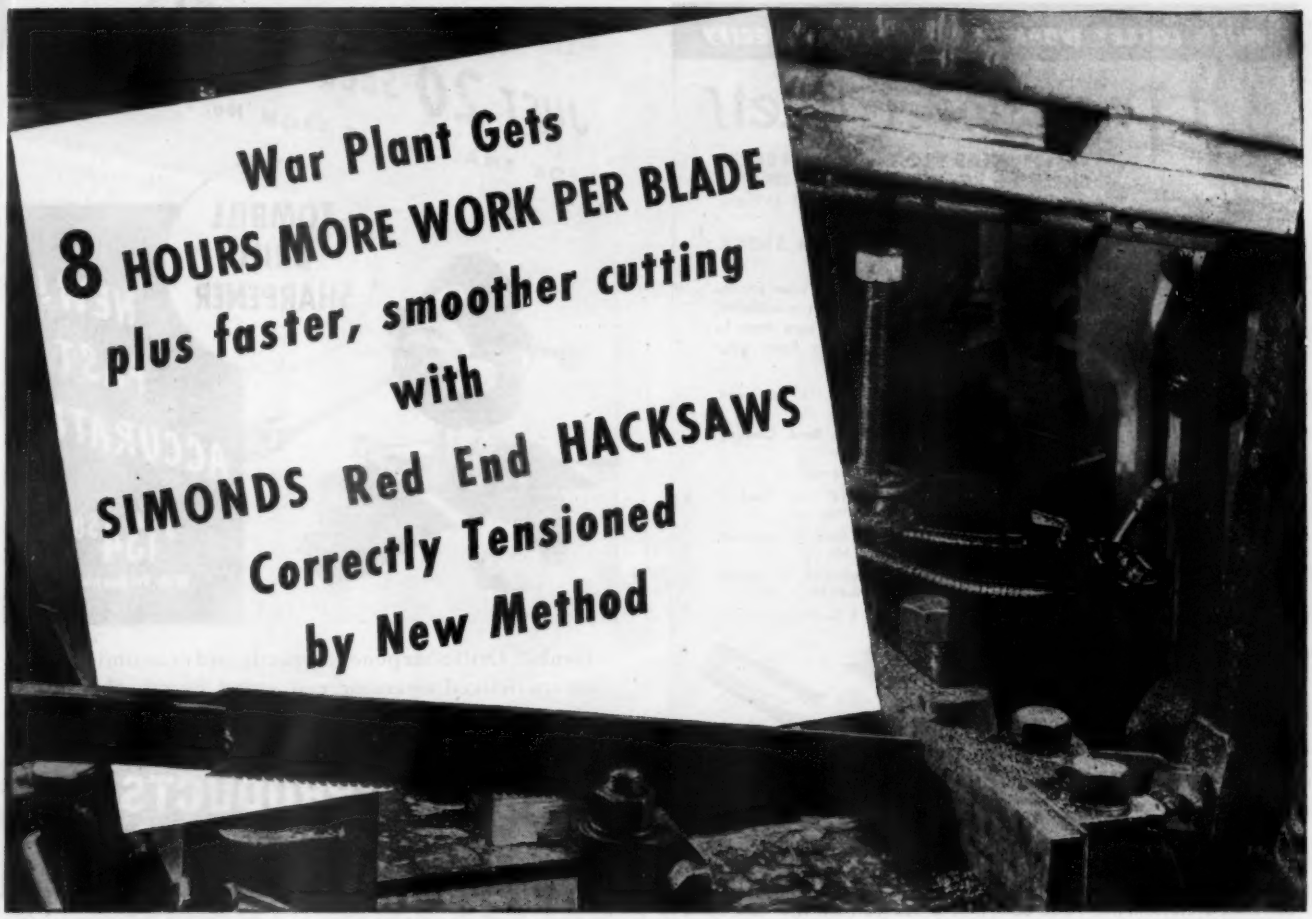
An almost unlimited use is offered by this instrument for inspecting duplicate parts in quantity or any small parts with flat surfaces or recesses.

Use of standard blocks made possible by raising or lowering table increases capacity to take material up to 2" in height. Graduated to read to .001 inch; height 9¾"; weight 5 lbs. 1¼ oz.; depth from frame to spindle 1⅝".

Can be supplied with sliding head and table; also on a stand with throat 3" deep.

Full details on request

RANDALL & STICKNEY
Makers *Waltham 54, Mass.*



IN cutting stainless steel bars, this plant could get only about 9 hours from a hacksaw blade . . . and many cuts were concaved because of incorrect blade tension. Then a *Red End* Blade was put in the same machine . . . *correctly tensioned by Simonds' new technique* . . . and delivered 17 hours of straight, smooth cutting, *almost double the former blade-life.*

You can get comparable results on *your own* power hacksawing operations, simply by doing this: Have your Industrial Supply Distributor bring a Simonds engineer to demonstrate this new tensioning technique right on your own machines. Then you will see for yourself how correctly-tensioned Simonds Red End Blades will speed up and improve production . . . reduce the need for finish-grinding . . . and keep machines more constantly in operation by sharply increasing life-per-blade. This demonstration involves no cost, no obligation, no interruption of your production. Get in touch *now* with your dealer or distributor, or with the nearest Simonds Branch Office.

Shorten the War . . . BUY BONDS!

BRANCH OFFICES
1350 Columbia Road, Boston—27, Mass.; 127 S. Green St., Chicago—7, Ill.; 228 First Ave., San Francisco—5, Calif.; 311 S. W. First Ave., Portland—4, Ore.; 520 First Ave. So., Seattle—4, Wn.; 31 W. Trent Ave., Spokane—8, Wn.

SIMONDS
SAW AND STEEL COMPANY
FITCHBURG, MASSACHUSETTS

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

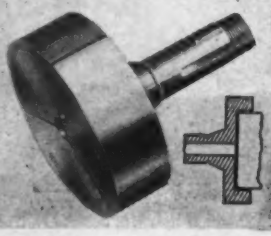
For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

The *Precision* name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. Literature on request.

- MODEL 3AT: For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Sebauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.

KLUTCH - KOLLET (Step Chuck) for chucking work to 2¾" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.

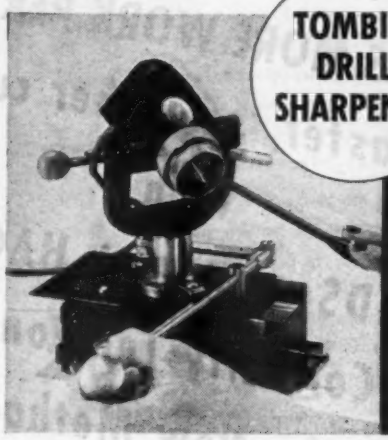


- 5C KLUTCH-KOLLET NOW READY. List unbored $10.50.
- PRECISION Collets also available in Hex. and Square.

GENERAL DIE-STAMPING-TOOL COMPANY • 262 Mott St., New York 12, N.Y.

JUST 20 SECONDS

FOR SMALL DRILLS FROM No. 70 TO 15/64"



Tombill Drill Sharpener is speedy and economical. An inexperienced operator can grind exactly the right degree on drills from No. 70 to 15/64". Write for folder.

MERCURY PRODUCTS CO.
423 EUCLID AVENUE
CLEVELAND 14, OHIO

The Tubular MICROMETER

FEATHER TOUCH

SUPERIOR MICRO-METERS for "PRECISION" MEASUREMENT . . . A Tumico TRADITION

The excellence in design and the sturdy construction you find in our Tubular Micrometers is the result of over thirty years of service to the industry. Today Tumico Micrometers enjoy the world wide acceptance of discriminating workmen.

PROMPT DELIVERY!

The Tubular Micrometer Company
St. James, Minnesota, U. S. A.

NUMBERALL

ROTARY STAMP

A single wheel Stamp for stamping figures and letters on brass, aluminum or soft steel; plastic, wood, with a single hammer blow. All figures on 1 wheel; entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Characters furnished any size from 1/16" to 3/8". Also supplied with shank for press. Write for Bulletin AM-1H.

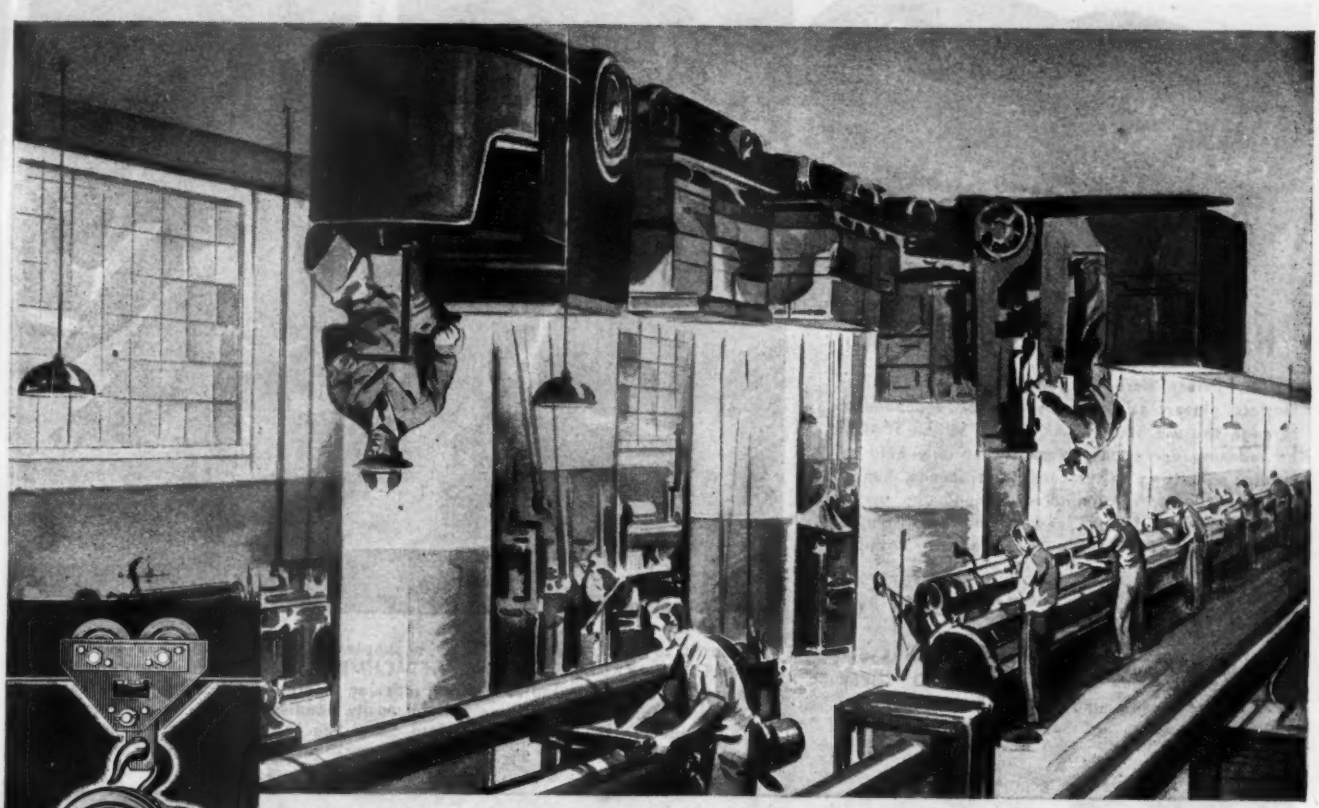
NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

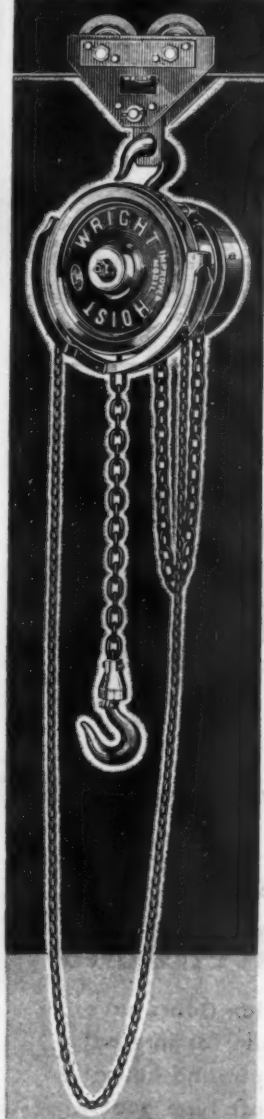
H. & H. ACCURATE SURFACE PLATES and ANGLE IRONS for precision work

Surface Plates and inside and outside Angle Irons of first grade gray iron. Nickel iron or Meehanite castings — normalized. Finished machined, hand scraped or ground as required.

Write for sizes and details.

H. & H. MACHINE TOOL CO., Waltham, Mass.





CAPACITY
¼ TO 40
TONS

Wright

gives the one-story shop two production floors

WRIGHT HOISTS and **CRANES** can make your idle ceiling help speed production. From their long years of accumulated experience, **WRIGHT** engineers can suggest ways to use your overhead space so that a one-story shop virtually has two production floors. **WRIGHT** Improved High Speed Hoists, **WRIGHT** Speedway Electric Hoists, and the famous **WRIGHT** Cranes have long made possible fast, safe, economical transportation of materials. • Your local **WRIGHT** distributor is well qualified to suggest methods for both speeding production and saving money. You will find him listed in your metropolitan classified telephone directory. You can depend upon him. If your problem is special, ask your distributor to call a **WRIGHT** engineer, who has had years of experience in solving all manner of material handling problems.

WRIGHT MANUFACTURING DIVISION
York, Pa., Chicago, Denver, Los Angeles, New York, Portland, San Francisco

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT • CONNECTICUT

In Business for Your Safety

WRIGHT *Improved High Speed* **HOISTS**

HOLD INDEXING WORK SECURELY . . . and make heavy cuts ACCURATELY

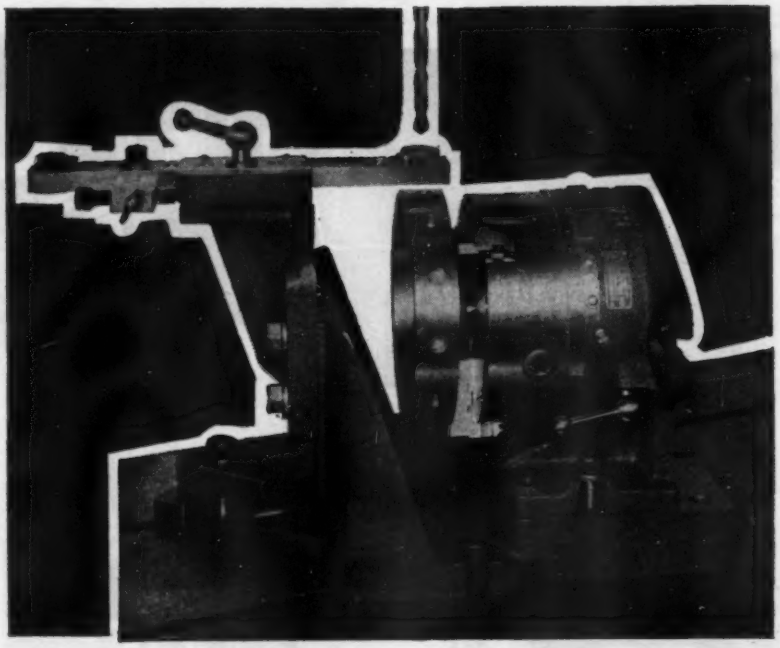
. . . WITH THE

HARTFORD SUPER-SPACER

Faster, better work—on drills, milling machines, slotters, planers or jig borers—can be depended on through the use of the HARTFORD SUPER-SPACER on indexing operations. Work is not only held securely, permitting faster feeds and speeds, but all chance of error is eliminated through the use of mask plates. Indexing is fast and positive; accuracy is assured even in the hands of unskilled operators.

Investigate TODAY!

Write at once for illustrated booklet showing typical applications of the HARTFORD SUPER-SPACER and explaining in detail the many advantages it offers on both production and tool room work.



Secured to the SUPER-SPACER by a supplemental easily attached base, the HARTFORD RADIAL DRILLING ATTACHMENT provides a simple, practical means for handling radial drilling indexing operations. Variations in length and diameter in radia drilling can be easily handled. Set-up time is neglible. This attachment will it any Hartford Super-Spacer and can be purchased at any time. It will enable you to get more work out of your "HARTFORD."

THE HARTFORD SPECIAL MACHINERY COMPANY

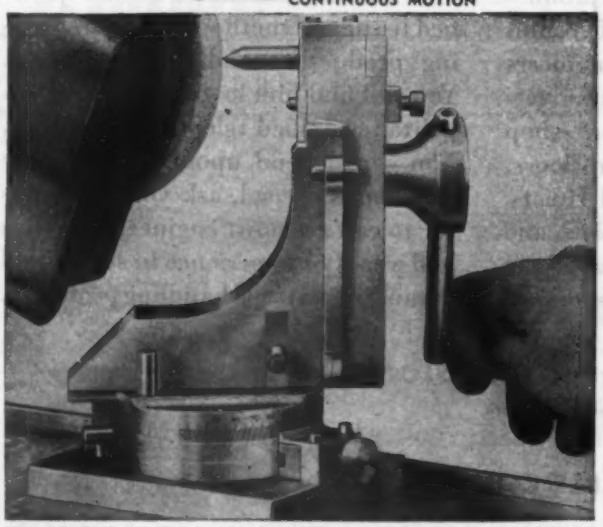
HARTFORD CONNECTICUT

USE

Fluid-motion

for modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION



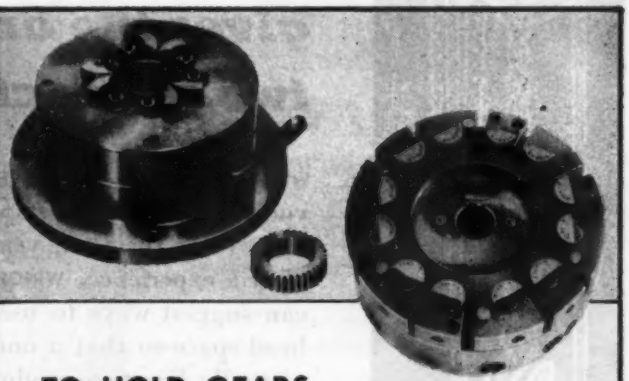
The J & S Model "E" Radii & Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

FEATURES

Fluid-motion dressing.
.0001" accuracy.
Automatic centering.
Chatterless and dustproof.
14" wheel capacity.
Versatile and adaptable.

J. & S. TOOL CO.

477 MAIN STREET
EAST ORANGE 1, N. J.



TO HOLD GEARS
with precision for boring or grinding
HAVE TEETH GRIPPED ON LINE OF ACTION

Principle used only in

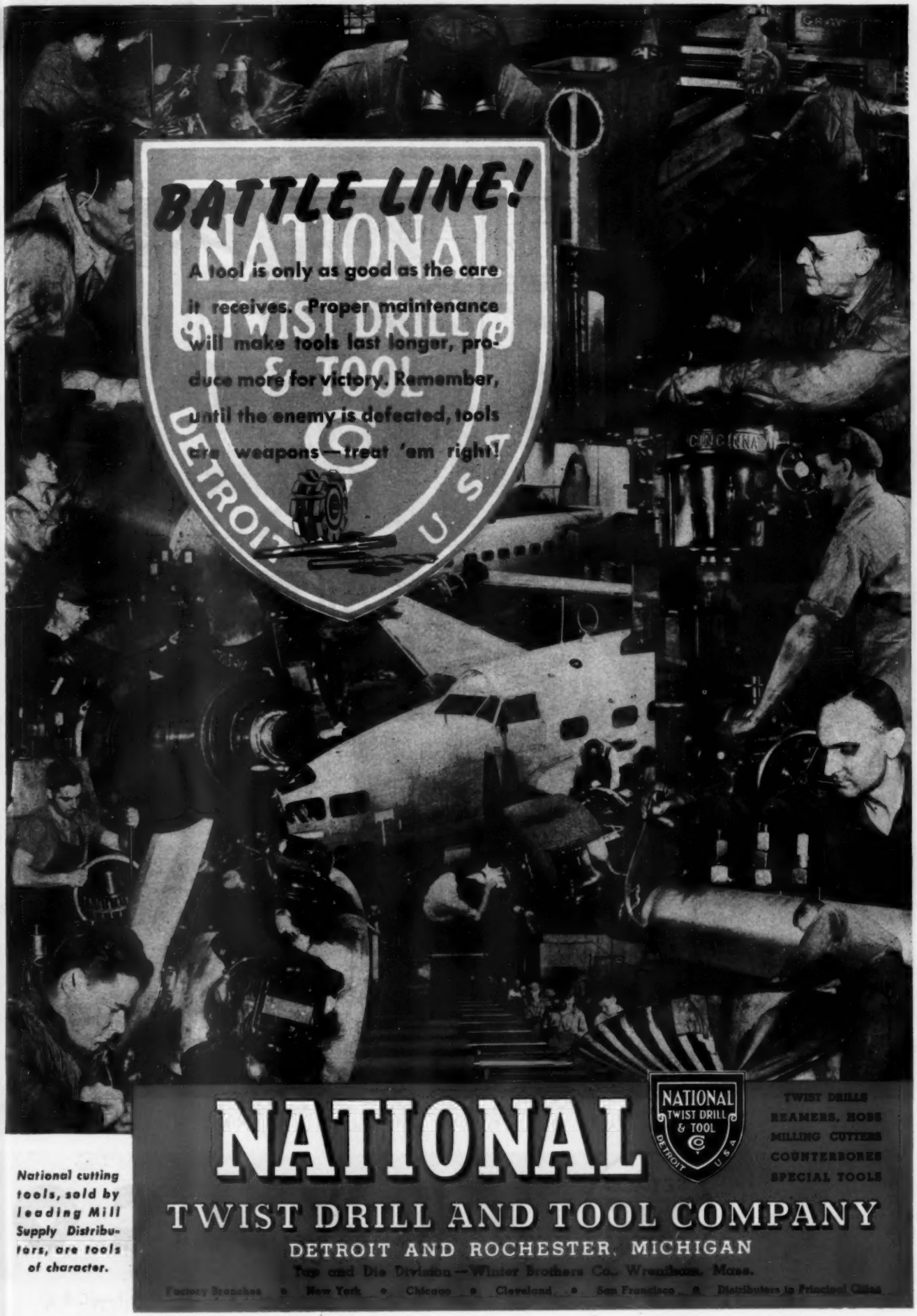
MATCH-IT GEAR CHUCKS

Method eliminates distortion. Gears have perfect, round holes. Made for internal and external gears, for spur and helical gears, and for countershaft type gears.

Send for catalog

LeMaire Tool & Manufacturing Co.

2665 So. Telegraph Rd., Dearborn, Mich.


BATTLE LINE!
A tool is only as good as the care it receives. Proper maintenance will make tools last longer, produce more for victory. Remember, until the enemy is defeated, tools are weapons—treat 'em right!
NATIONAL
TWIST DRILL & TOOL
DETROIT U.S.A.
NATIONAL
TWIST DRILL & TOOL
DETROIT U.S.A.
TWIST DRILLS
REAMERS, HOBS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS
NATIONAL
TWIST DRILL AND TOOL COMPANY
DETROIT AND ROCHESTER, MICHIGAN
Tap and Die Division—Winter Brothers Co., Wrentham, Mass.
Factory Branches • New York • Chicago • Cleveland • San Francisco & Distributors in Principal Cities

National cutting tools, sold by leading Mill Supply Distributors, are tools of character.

A CHANGE-OVER

TEXACO

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT—CBS

R "MUST" ...

"Cleaning and preserving of production equipment shall be accomplished with minimum delay after 'shut down'."

Army Service Forces Bulletin, P.S. No. 300

AS Government contracts are terminated, millions of dollars worth of idle Government and privately-owned machinery, precision tools, and other production equipment will have to be promptly protected against damaging rust for periods ranging from weeks to years.

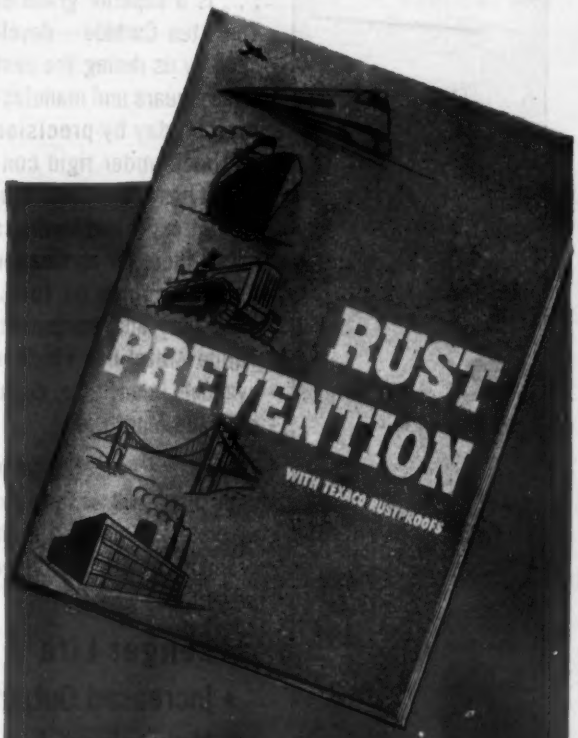
That is why *Texaco Rustproof Compounds* and other Texaco rust preventives should be available for prompt use when change-over time arrives. These effective products meet Government specifications for exterior and interior application, and are available for immediate delivery. By ordering NOW you will eliminate possible last-minute delays and disappointments.

For exterior application, *Texaco Rustproof Compounds* provide penetrating, self-sealing films which are not only waterproof but highly resistant to chemicals and fumes. Easily applied with brush or spray gun, they remain soft, healing over any scratches and abrasions. *Texaco Rustproof Compounds* are long lasting and very economical.

In many cases where rusting already exists, costly chipping and scaling is eliminated because *Texaco Rustproof Compounds* penetrate and loosen the scale so thoroughly that removal is greatly facilitated.

Texaco Rustproof Compounds have proven highly successful in protecting all types of parts and equipment from weather and salt water in overseas shipments.

Texaco Lubrication Engineering Service and Texaco Products for *interior* and *exterior* rustproofing are available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd St., New York, 17, N. Y.

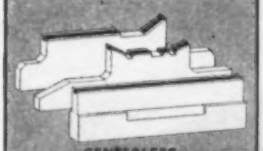


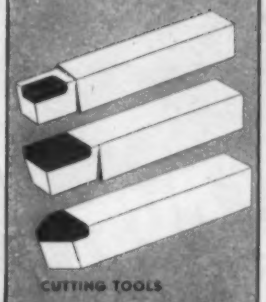
FREE! Send for this 36-page booklet today. Tells how Texaco Rustproof Compounds prevent rust, where and how to apply them and why they are so successful. A single suggestion in this booklet may save thousands of dollars.

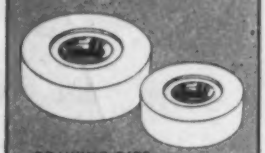
Rustproofing Products

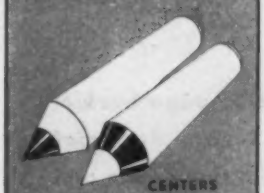
HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

TALIDE-TIPPED *for Production!*









TALIDE METAL

. . . is a superior grade of Tungsten Carbide—developed by us during the past twelve years and manufactured today by precision methods under rigid control. It has exceptional density, strength and hardness and is ideal for application at wear points on tools, machinery and equipment. Talide Metal bar stock is available in any size, diameter and length.

The use of Talide Metal in your plant will assure you of constant, uninterrupted production with the added advantages of . . .

★ Longer Life
★ Increased Output
★ Maintained Size
★ Closer Tolerance
★ Fewer Rejects

Thousands of Talide-Tipped Tools, Dies and Wear Resistant Parts are shipped daily all over the country to Arsenals and War Plants producing cartridge cases, small arms ammunition, primer cups, airplanes, tanks, ships, rifles, machine guns and other war material.

TIPPED WITH TALIDE TUNGSTEN CARBIDE

METAL CARBIDES CORPORATION
YOUNGSTOWN, 5 OHIO
TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS

WIRE AND SHEET METAL GAGES

DURABLE AND ACCURATE

McGrath St. Paul wire and sheet metal gages are hardened steel with black finish, and held to within a tolerance of 3/10,000 inches. Gage numbers and decimal equivalents are clearly stamped.

◀ *Available for immediate delivery* ▶

AMERICAN WIRE GAGE, standard for non-ferrous metals.
BIRMINGHAM WIRE GAGE, for iron wire, hot and cold rolled steel and sheet metal.
U. S. STANDARD GAGE, for sheet and plate iron. (also comes in rectangular shape).

Write for the McGrath St. Paul catalog illustrating Vernier Calipers, Height Gages, etc. Address Room 110

McGRATH ST. PAUL CO.
5th and Wacouta Streets St. Paul 1, Minnesota

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 288 4 nr. 17, '44 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: A. C. Behringer, 324 N. San Pedro St., San Francisco: Guy Reynolds, 464 Vernon St., Oakland, Canada: F. Barber Machinery Co., Toronto, Canada.

HOLMAN *BETTER, FASTER HOLE FINISHING*

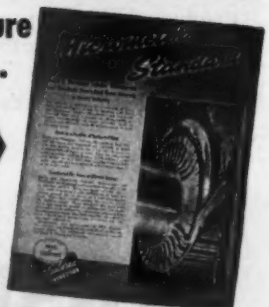
HELICAL
TAPER PIN
REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

How to Accurately Measure Large* Unwieldy Parts...
* Up to 168"

...is explained in this **FREE BOOKLET**



Write for your copy today. Learn how D&T Tubular Micrometers and Standards can be applied as accurately to the measuring of work up to 168" as ordinary micrometers are to small precision parts.

Ask for Bulletin No. D-200.

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. • Milwaukee 14, Wisconsin

PHYSICAL AND CHEMICAL PROPERTIES

PIN A MEDAL ON *Yourself!*

"Mr. Dag"

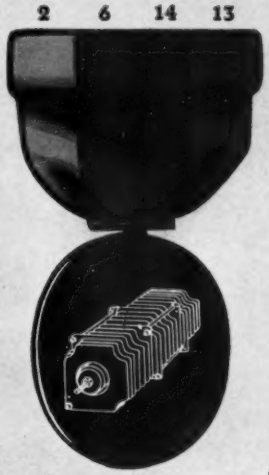
You get far more than just a smooth, black liquid concentrate when you use Dag colloidal graphite. A versatile group of valuable properties is also at your service. The most important of these properties are listed here. A color and a number is given to each for easy reference.

In the typical applications below, trace the record of some of these properties. You can do this simply by matching the ribbon colors against the property chart.

1 3 14 13 15

1, 3, 14, 13, 15
CITATION: "Die and punch life is increased and forgings having better finish are produced to closer tolerances with Dag colloidal graphite treated lubricants."

2 6 14 13



2, 6, 14, 13
CITATION: "Excellent electrical contact is obtained between copper oxide discs and adjacent metal electrodes in rectifiers when dry coatings of Dag colloidal graphite are used on the crystalline oxide surfaces."

1 2 3 14 8

1, 2, 3, 14, 8
CITATION: "Dag colloidal graphite is extensively used to impregnate asbestos packings for pumps handling chemicals and explosive fluids. It protects the packing against chemical action and provides safe, dry lubrication."

Check this list and pick out those properties which you can use. Then state your problem to us and let our engineers give you the benefit of their experience. It is quite possible that they have already studied a parallel application. You'll pin a medal on yourself for calling in Mr. Dag.

1 — Slippery—a Good Lubricant. Softer than talc

2 — Conducts Electricity

3 — Withstands Temperature Extremes

4 — Absorbs, Radiates and Conducts Heat

5 — Maximum Purity

6 — Low Coefficient of Expansion

7 — Particles Bear Like Electric Charges

8 — Insoluble in Acids and Alkalies

9 — Black and Opaque

10 — Gas Adsorbent

11 — Little Photoelectric Effect

12 — Miscible with Most Fluids

13 — Films Adhere Tenaciously and Dry with Sharp Edges

14 — Microscopically Fine Particles. Penetrates Fine Pores

15 — An Excellent Suspension

dag
REG. U.S. PAT. OFF.
COLLOIDAL PRODUCTS

Dag, Oildag, Aquadag, Glydag, Castordag and Prodag are registered trade marks of Acheson Colloids Corporation. Copr. 1944 by Acheson Colloids Corp.

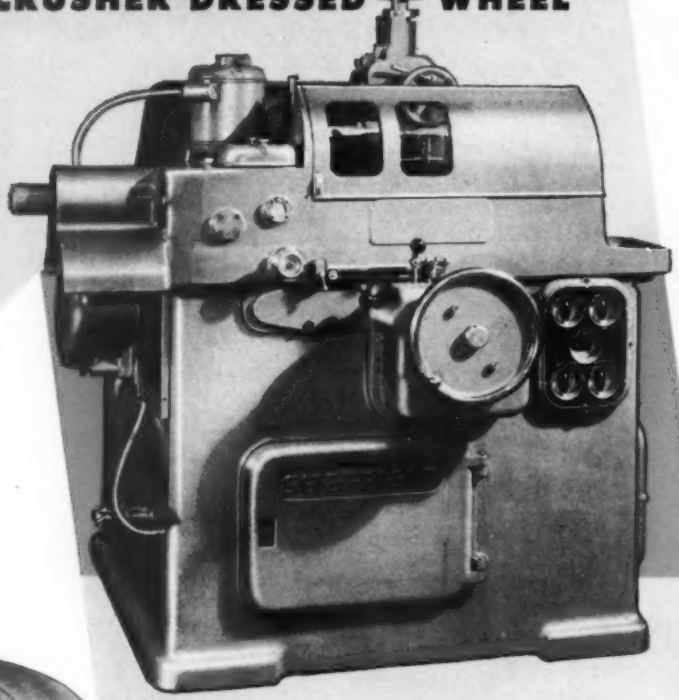
ACHESON COLLOIDS CORPORATION

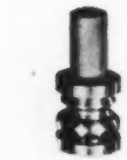
PORT HURON, MICHIGAN

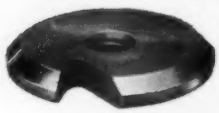
THREADS and FORMS

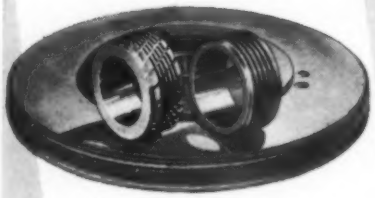
PLUNGE GROUND

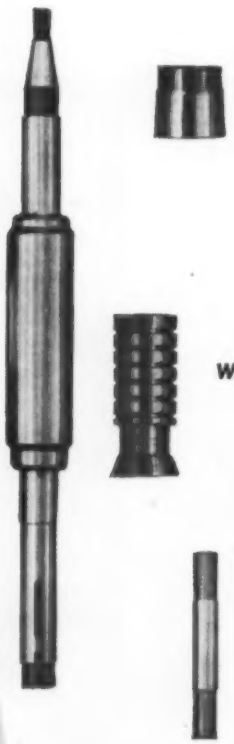
WITH CRUSHER DRESSED WHEEL











The crusher dressed multi-ribbed grinding wheel offers important savings in both time and production costs in grinding precision threads and circular form or profile work.

In a plunge cut with such a wheel on the Sheffield Thread and Form Grinder, a single or multi-start threaded section, the length of which does not exceed the thickness of the wheel, is completed in 1-½ revolutions of the work part. For larger parts traverse grinding is used.

Wheels are crusher dressed in a small fraction of the time it takes by conventional methods and they have more effective cutting surfaces. Furthermore, the multi-ribbed wheel stands up longer.

Write for technical bulletin.

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

For Comparison

THIS PAGE is a full size cover reprint from a new, informative, free booklet on Industrial Testing now being issued by Triplett & Barton, Inc. It contains comprehensive data on testing techniques and apparatus . . lists examples applicable to most industries . . cites cases wherein war production was speeded up through prefabrication and material testing . . . invaluable to postwar planning committees. Write for your copy today. Use your firm letterhead. State: Name, Position and Special Interest in the Testing Field.

Library Dept. 57, TRIPLETT & BARTON, INC., Burbank, California, U. S. A.

Triplett & Barton

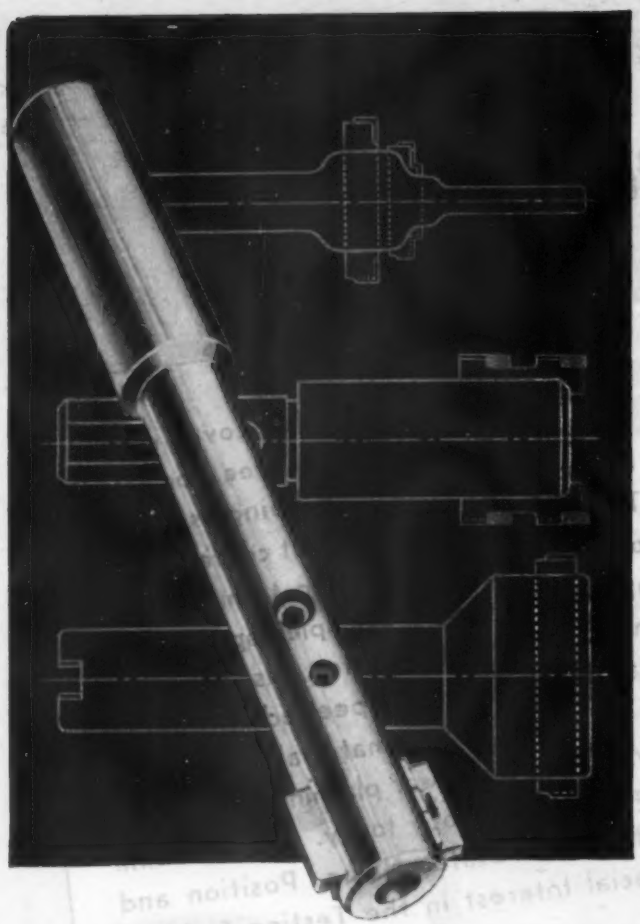
INCORPORATED

KNOWN FOR THE BEST IN TESTING METHODS

BURBANK, CALIFORNIA

SEATTLE, WASHINGTON WICHITA, KANSAS

MILLION VOLT X-RAY UNIT



finish reaming

. . . IN ONE OPERATION

Close tolerances as low as .0002 of an inch can be held with Madison reaming tools. Madison tools at the same time produce a mirror-like finish that in most cases eliminates additional finishing operations. They answer modern industries' demand for faster, better techniques for all reaming operations. Time saved with Madison's allows a lower estimate on present and post-war contracts.

Madison tools are simpler and easier to adjust, thereby saving vital minutes in set-up time. With Madison's, distortion, flute load and overheating are avoided. This eliminates shrinking or tapering of the finished hole and cuts costly rejects and scrap.

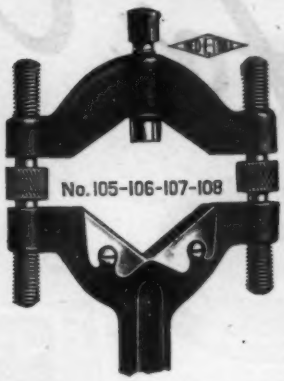
Madison's are used for rigid or floating reaming on engine and turret lathes, automatics, radial and standard drills, boring mills, millers and machines for special operations. Manufactured in standard and special sizes for use on hard metals, soft metals and plastics.

Write for new Madison Catalog just off the press. Shows complete lines, prices and grinding instructions that will save you time and money.

MADISON
MANUFACTURING COMPANY
SPRING & BAUER STS., MUSKEGON, MICH.

MADISON

EASILY ADJUSTED FOR SIZE



And one screw holds work.
Always in balance.

Send for Catalog A-44

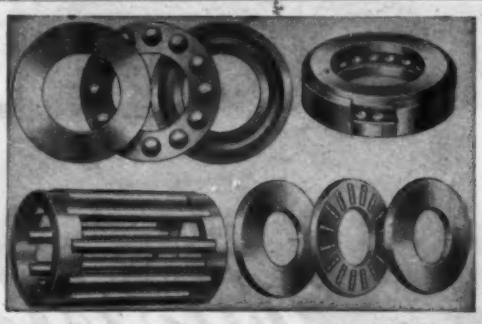
The READY TOOL CO.
IRANISTAN & R. R. AVENUES,
BRIDGEPORT . . . . . CONN.

HARDNESS TESTER

Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4090

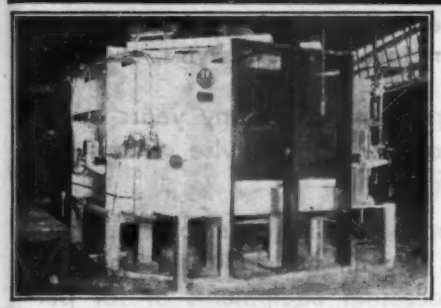


B & R B

Precision Bearings have been recognized for many years for their dependability. These bearings can be selected from our catalog of standard sizes which are carried in stock.
THE BALL and ROLLER BEARING CO., Danbury, Conn.

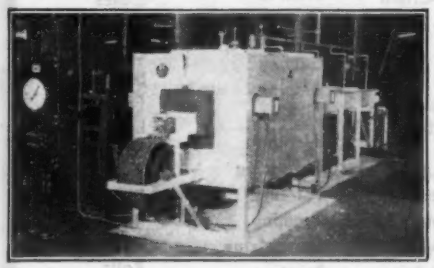
EF FURNACES

For Every Industrial Heat Treating Process



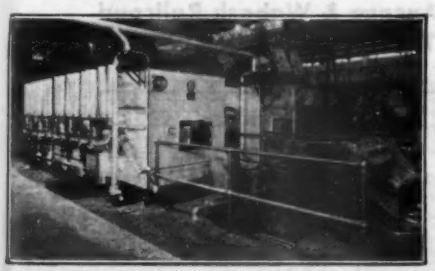
EF oil or gas fired rotary hearth furnaces for various heating and heat treating processes

Pressed metal powder products are sintered in this EF continuous special atmosphere furnace.



EF continuous brazing furnaces—several types for aluminum, copper & brass brazing.

EF gas fired furnaces with charging crane and quench for heat treating large castings, etc.



EF gas-fired, radiant tube chain belt furnace—for scale-free hardening 175 to 2000 lbs. per hr.

PRODUCTION FURNACES ENGINEERED TO FIT THE JOB

Gas Fired, Oil Fired, and Electric Furnaces

For Any Process, Product or Production

ALL TYPES OF FURNACES AVAILABLE

With a background of over 25 years of practical furnace building experience and with hundreds of designs, types, and combination of types available which have proven successful on various applications, THE ELECTRIC FURNACE CO. is prepared to design and build any size or type of kiln or furnace required for any industrial heating or heat treating process.

IMPARTIAL ANALYSIS OF CUSTOMER'S REQUIREMENTS

As designers and builders of both electric and fuel fired equipment, EF engineers are in a position to make a thorough and impartial analysis of any company's furnace or heat treating problem and recommend, design, and build the best size and type for the job.

EF DESIGNING AND MANUFCTURING FACILITIES

With a large and experienced engineering staff, and with our own experimental and research departments, structural shop, machine shop, pattern shop, transformer shop, and adequate available foundry service, THE ELECTRIC FURNACE CO. is largely a self contained unit. This centers the responsibility of engineering, manufacturing, assembling, and installing in one large and competent organization.

EF FURNACES ARE BUILT FOR EVERY PROCESS INCLUDING

Annealing	Copper Brazing	Normalizing
Aluminum Brazing	Drawing	Process Heating
Billet Heating	Enameling	Scale-free Hardening
Bright Annealing	End Heating	Silver Soldering
Bright Hardening	Forging	Spherodizing
Ceramic Firing	Hardening	Sintering Powder Metal Products
Carburizing	Malleablizing	
Clean Annealing	Nitriding	Stress Relieving

EF FURNACES ARE BUILT IN VARIOUS TYPES INCLUDING

Belt and Box Types	Hearth Types	Roller Hearth
Car Types	Mesh Belt Conveyor	Roller Rail
Chain Belt Conveyor	Pit Types	Rotary Drum
Chain Strand Conveyor	Pusher Types	Rotary Hearths
Comb. Electric and Fuel	Reciproating Hearth	Suspended Conveyor
Continuous - Misc. types	Radiant Tube	Vertical Cylinder
Forging Furnaces	Recuperative	Walking Beam, etc

ACCESSORIES WE BUILD FOR EF FURNACES INCLUDE

Automatic Pushers	Gas Preparation Units	Time and Labor Saving Material Handling Equipment
Charging Machines	Pressure Systems	
Continuous Quench Tanks	Pumping Equipment	
Control Panels	Quenching Machines	Transfer Mechanism
Conveyor Equipment	Spec. Atmos. Generators	Transformers
Gantry Cranes	Switchboards	Washing Machines

INDUSTRIES USING EF EQUIPMENT for VARIOUS PROCESSES INCLUDE

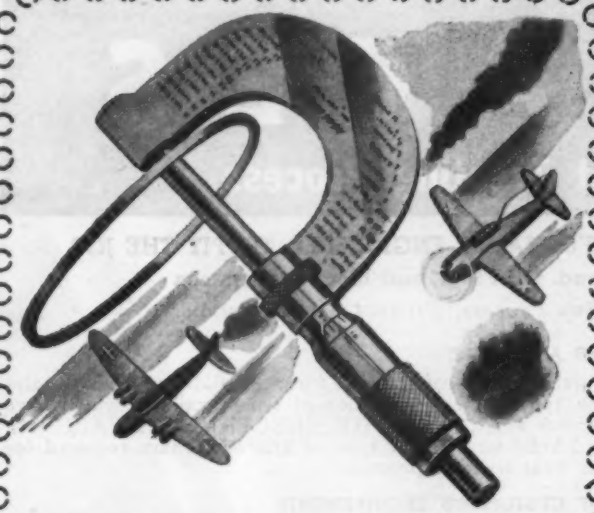
Automotive and Aircraft	Ceramic and Chemical	Radio and Refrigeration
Aluminum and Magnesium	Copper and Brass Plants	Stamping and Forging
Agriculture Implement	Electrical Appliance	Tractor and Truck
Air Conditioning	Iron and Steel Casting	Wire, Rod, Tubing and Strip, ferrous and non-ferrous)
Ball and Roller Bearing	Malleable Iron	
Bolt and Nut Mfgrs.	Motor and Engine	

ELECTRIC FURNACE CO. engineers have been able to improve heat treating processes, increase furnace production capacities or reduce the cost of heat treating operations in hundreds of prominent plants. Their services are available at your plant or at our offices. We shall be glad to give complete information, including installation and operating costs—and submit samples of products treated in equipment we have built.

Submit your production furnace or kiln problems to EF engineers. No job is too large or too unusual.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production



PRECISION
where it counts!

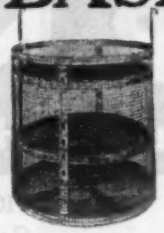
The margin between victory and disaster to the fighter pilot depends upon that all important factor — precision. Likewise today's demands on marking equipment are for precision — plus speed. With a background of continuous pioneering and development since the beginning of this century, Noblewest equipment is today foremost in the field of high-speed precision metal marking. Our new catalog supplement No. 43 describes Noblewest Marking Machines and Methods that meet practically all requirements of industry. Write for it today.

NOBLE & WESTBROOK MFG. CO.
Marking specialists since 1904
EAST HARTFORD, CONN.

MODEL 183
Designed for marking P & W Aircraft Engine piston rings where distortion of thickness must be held to within .001 of an inch. Will mark all sizes of rings up to 6" and can be reinstalled for marking other flat parts of uniform thickness at rapid production speeds.
PWA

MARK IT BEST WITH NOBLEWEST® NOBLEWEST IMPROVED MARKING DEVICES

BASKETS TRAYS



WOVEN WIRE PROCESSING FIXTURES

made to individual requirements— all metals, weaves, styles, shapes

We have been specialists for many years in the making of precision wire cloths, wire screens and woven wire products.

We apply our same precision principles in fabricating wire cloths into finished industrial units, for production or processing equipments or for permanent parts of countless industrial products.

We invite your inquiries for wire cloths of all commercial metals or alloys or weaves, in continuous lengths or cut to size, or processed to meet your individual requirements.

"Perfect" alloys and metals	"Perfect" Wire Cloth weaves	"Perfect" Wire Cloth processing	"Perfect" Wire Cloth products
Super-Loy	Arch-Crimp	Bending	Baskets
Steel	Coiled	Binding	Circles
Galvanized	Double-Crimp	Brazing	Cones
Tinned	Double-Fill	Calendering	Crates
Stainless Steel (18-8)	Dutch	Clinching	Cylinders
Nickel-Chromium alloys	Filter	Cutting	Discs
Aluminum	Flat-Top	Dipping	Forms
Brass	Herringbone-Twill	Dishing	Leaves
High (70-30)	Intermediate-Crimp	Flanging	Lengths
Low (80-19-1)	Rek-Tang	Flattening	Panels
Bronze	Selvage-Edge	Forming	Pieces
Commercial (90-10)	Straight-Warp	Framing	Racks
Phosphor (95-5)	Stranded	Galvanizing	Ribbons
Copper	Sta-Tru	Painting	Rolls
Monel Metal	Triple-Warp	Shearing	Sections
Nickel	Twilled	Slitting	Segments
Any special alloys available in rod or wire form	Twisted-Fill	Trimming	Spacers
	Twisted-Warp	Arc-Welding	Strips
		Gas-Welding	Template shapes
		Spot-Welding	Trays

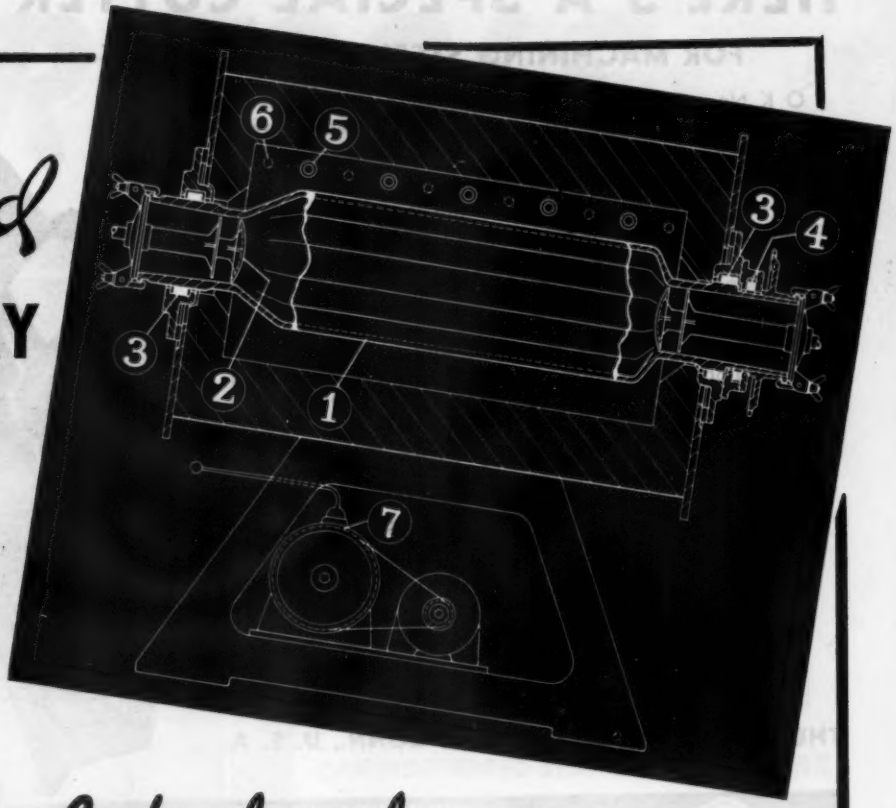
We will follow your specifications and blue-prints exactly as your production engineers have prepared them—or we will submit suggestions for your approval.

The LUDLOW-SAYLOR WIRE COMPANY
Newstead Avenue & Wabash Railroad
ST. LOUIS 10, MO.

for annealing, brazing, carburizing, cyaniding, dipping, hardening, heat-treating, handling, nitriding, pickling, plating, quenching, washing.

Improved

No. 2GA ROTARY CARBURIZER



This machine is the modern counterpart of our long popular No. 2-B size Carburizer.

It embodies all the most prominent advantages of Rotary Carburizers, which are as follows:

- May be used for atmosphere work without modification.
- Mixing by rotation insures uniformity.
- Charging and discharging labor is minimized by the tilting feature.
- Work may be quenched or slow cooled, as desired.
- Maintenance and handling of boxes is eliminated.

Introduced at the Metals Show

• BOOTH B1J3 •

BETTER IN SEVEN DIFFERENT WAYS

1. (See Diagram) Twelve-sided retort reduced at both ends is especially suited for handling small articles. The smaller entrance permits a more gradual and thus better discharge for quenching. The new construction permits preheating the carburizing gas before entering the work chamber, thus resulting in more uniform carburizing.
2. Improved small area spacing disc is easier to heat rapidly and uniformly and is much lighter and convenient to handle when charging and discharging.
3. Retort is supported on alloy roller bearings front and rear. This maintenance-free construction permits smooth and continuous rotation with the least amount of power.
4. New roller thrust bearing carries load smoothly in tilted position.
5. New design heat-resisting alloy burners with greater radiating surface are cooler in operation and are clayed into improved refractory tunnels.
6. Burners are arranged in two sections to heat work rapidly and uniformly to carburizing temperature. One section may be shut off to operate uniformly at temperatures as low as 1000° F. for clean hardening, annealing high drawing, etc.
7. Different classes of work are accommodated by a motor drive with gear shift transmission which gives retort speeds of ¼, ½, 1 and 1½ r. p. m.

Write for literature on the new Carburizer and ask for our complete Condensed Catalog No. 604.

AMERICAN GAS FURNACE CO.

ELIZABETH, NEW JERSEY.

HERE'S A SPECIAL CUTTER

FOR MACHINING STEEL AT HIGH SPEEDS

O K Negative Rake and Spiral Milling Cutters take a "shearing" cut from rear of blade to point, leaving a high finish on steel. This often saves the cost of an extra finishing operation.

Such a tool must be made of the very best material, with great ruggedness embodied in the design. Extreme strength and rigidity being inbuilt characteristics of O K Milling Cutters, they form a natural base for this new type of cutter.

Though these cutters are now sold only under war regulation, to be sure of postwar deliveries, we suggest that you register your future needs with us now.

Make Your Cutters Last Longer
SEND FOR THIS NEW BOOKLET

This useful booklet, just off the press, is a complete treatise on the grinding of milling cutters. Profusely illustrated, clearly described. There is no charge for this booklet.

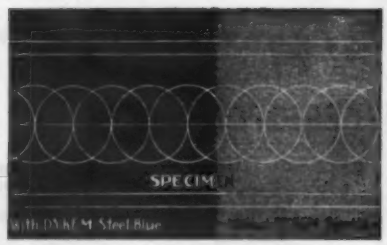
THE O K TOOL CO., SHELTON, CONN., U. S. A.

INSERTED-BLADE METAL CUTTING
OK TOOL SYSTEM
MANUFACTURED ONLY BY THE O K TOOL COMPANY, SHELTON, CONN., U. S. A.

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301 B N 11th St., St. Louis, Mo.
In Canada: 444 Pacific Ave., Toronto, Ont.

ACROMARK your products ..FASTER!

STAMPS BOTH LETTERS AND FIGURES INTO STEEL AND ANY METAL OR PLASTIC

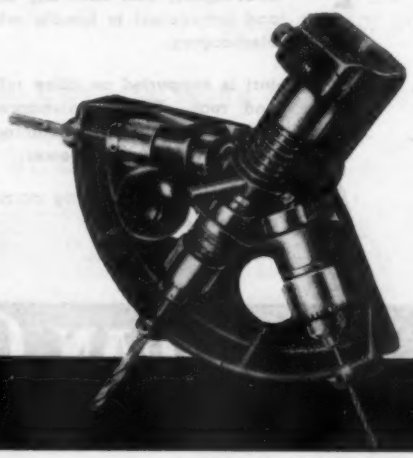
WRITE FOR LITERATURE

THE ACROMARK CO.
ELIZABETH, NEW JERSEY

UNIVERSAL
DRILL PRESS TURRET HEAD

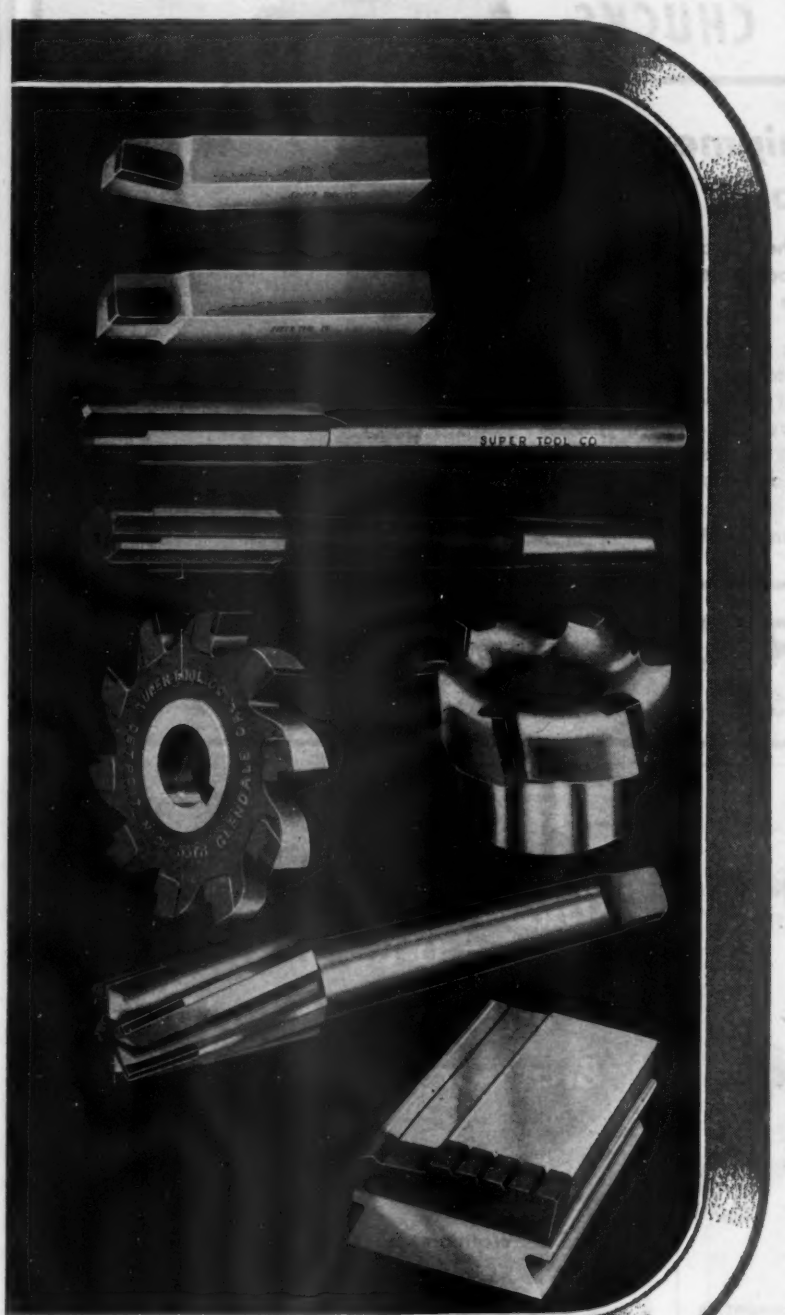
Clamps on quill of any standard Drill Press giving operator immediate choice of three different sized drills or tools. This permits continuous operation through elimination of moving work to different presses, thus effecting a saving in time and tooling.

It is simple to attach, you merely remove the chuck and depth gauge, slip the bracket over quill, tighten, and your three-position drill press is ready. The turret is equipped with three Jacobs chucks, ¼" capacity and is designed for maximum strength and rugged use. Shifting from one position to another is accomplished by a light movement of indexing lever. Positive indexing positions are provided for long life. All parts are interchangeable and tool maintenance is extremely simple. WRITE TODAY FOR FULL INFORMATION.



The Universal Engineering Co.
2230 NATIONAL AVENUE • SAN DIEGO 2, CALIFORNIA

SUPER TOOLS...



FOR SPEED and ACCURACY ON EVERY CUTTING JOB

CARBIDE TIPPED TOOL BITS

For turning, boring or facing these single point tools are extremely efficient when machining all materials including hard steels. They cut fast, clean and true. Low heat absorption means less pitting when cutting soft steels.

CARBIDE TIPPED STANDARD REAMERS

These extremely fast, true and clean cutting solid type standard reamers are available with either a straight or tapered shank. They have proved their ability to hold their size over long runs on all types of reaming jobs.

CARBIDE TIPPED MILLING CUTTERS

For faster production, greater accuracy and money-saving economy on all types of milling jobs—cast iron and non-ferrous materials as well as steel. The low cost of these milling cutters permits their use on short as well as long runs.

CARBIDE TIPPED SPECIAL TOOLS

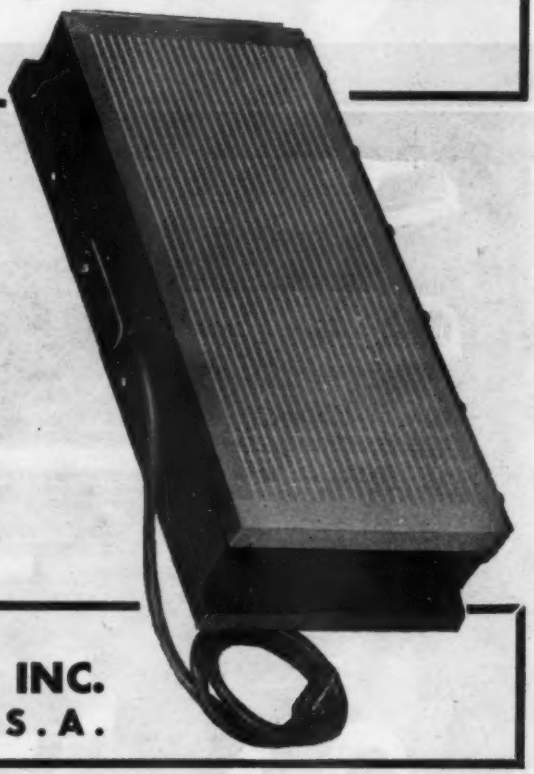
The wide experience of Super Tool engineers is backed by unequalled laboratory resources for creating special tools to meet your specific production needs. Super special tools are speeding production in hundreds of war plants. Send us your prints and specifications for recommendations and estimates.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

THE NEW LINE OF WALKER
ALL - PURPOSE MAGNETIC - ELECTRIC
LONGITUDINAL POLE CHUCKS



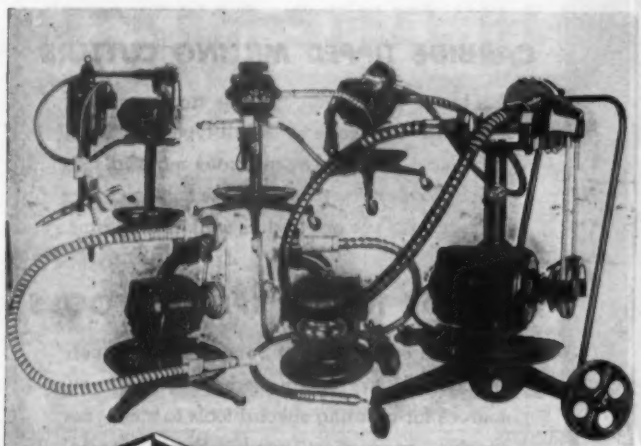
Available for prompt shipment in all sizes from 4"x10" to 12"x60"

In announcing these chucks, WALKER also wishes to call attention to the metal working industry that its line of bar pole chucks has been superseded by this new longitudinal pole type.

Improvements in the design have resulted in a sturdier chuck that withstands a lot more abuse and which is absolutely waterproof. This new chuck has also proved a more efficient method of holding work. The same fine pole divisions which were a feature of the now outmoded bar pole design are retained in the new line, with all the advantages which this construction has demonstrated.

Send at once for complete detailed information.

O. S. WALKER CO., INC.
WORCESTER, MASS., U.S.A.



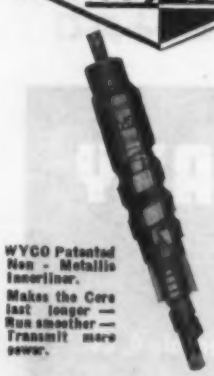
The WYCO Line

Whatever your requirement in a Flexible Shaft Machine

The Wyco Line carries a complete range of rugged, dependable units to fit any production need. The Wyco line is on the aircraft and armament front NOW, and doing a civilian production job as well — but for the post-war era — for even greater demands — the Wyco line will be geared up for 100% satisfaction in any situation where heavy, medium or light duty production is desired.

Single and Multiple Speed Floor, Bench and Suspension Models, as well as Multiple Speed Jack Shaft and Radial Type Machines, all carrying the Wyco Guarantee for materials and workmanship, are setting records for longer shaft life and greater production. Distributed through Jobbers.

Send for our New Catalog



WYCO Patented Non - Metallic Inserliner. Makes the Core last longer — Run smoother — Transmit more power.

WYZENBEEK & STAFF, INC.
838 W. Hubbard St., Chicago 22, Ill.

Available from Stock
= 0-80 and = 1-72
SCREWS and NUTS
Brass or Steel, Cut Thread
Class 3 Fit

Waltham is also equipped to furnish all types of
SPECIAL MACHINE SCREWS and SCREW MACHINE WORK
manufactured to special order.

Write for Catalog and Price List.

WALTHAM SCREW CO.
WALTHAM, MASS.

IN SMALL DRILLS AND LARGE DRILLS, MORSE QUALITY STANDS FOR PRODUCTION EFFICIENCY. . . REGARDLESS OF SIZE, YOU CANNOT BUY A BETTER DRILL THAN MORSE

MORSE

THERE *IS* A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY

NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

SAN FRANCISCO STORE: 1180 FOLSOM ST.

The AIR-MASTER sucks dust and grit right off the whirling wheels of grinders and buffers. Keeps the air free from these flying destroyers of health and machinery. Insures against their injuring the lungs of your employees and causing breakdowns of expensive machinery by getting into sensitive moving parts.

The AIR-MASTER is fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write today for full details.

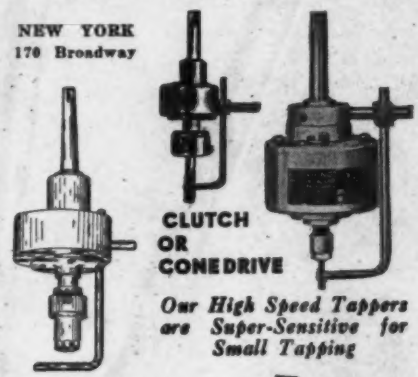
NOW AVAILABLE:
Two, three and five H. P. grinders and buffers on AA5 priority or better

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.
DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO
2676 MADISON RD.

ERRINGTON MECHANICAL LABORATORY
STAPLETON, STATEN ISLAND 4, N. Y.
TAPPING CHUCKS

NEW YORK
170 Broadway

CHICAGO
6701 N. Sioux Ave.



CLUTCH OR CONE DRIVE

Our High Speed Tappers are Super-Sensitive for Small Tapping

Friction
No. O O C. S.

Positive
No. O O H. S.

Style B Positive Stop Holds Work Down

Style C Graduated Adjustable Safety Friction

DRILL PRESS TURRET
Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustments in each tap-holder. If required.
Also, Opening Die-Heads; Opening Stud-Setters; Friction Secrew-Drivers and Nut-Setters, etc.

Almond Drill Chuck

The Pioneer

Almond Three-Jaw Drill Chucks were Pioneers in their field—the first to be placed on the market. They have formed a necessary part in the logical procedure of machine developments over the past seventy and more years.

Almond Drill Chucks are made in types and sizes to fit all machine tools and portable drills.

Write for complete details

T. R. ALMOND MFG. CO.
ASHBURNHAM, MASS., U. S. A.

The Original Manufacturers of Drill Chucks

Darwin
CANNON
High Speed Steel
18-4-1 Type

One of the first Tungsten-Vanadium High Speed Steels. Research and development have brought CANNON to a point where it is now recognized for reliability and service.

Particularly Successful for the Following:

Blanking Punches and Dies	Lathe Tools
Boring Tools	Milling Cutters and Teeth
Broaches	Planer Tools — Reamers

Furnished in Bar Stock, Billets, Drill Rod and Hardened Ground Tool Bits.
Bulletin on Request

DARWIN & MILNER Inc.
highest grade tool steels
1260 W. FOURTH ST. CLEVELAND 13, OHIO

ARMSTRONG ARMIDE *Carbide* TOOL SETS

CARBIDE-TIPPED TOOLS FOR EVERY-DAY OPERATIONS

ARMIDE TOOL SETS simplify many everyday jobs in tool rooms, shops and maintenance departments. They are standard, multi-purpose tools which offer special advantages on machining operations involving: (1) Long runs, (2) High speed operation, (3) Cast iron, (4) Tough alloy steels, (5) Non-metallics, (6) Hardened parts (obviate need for annealing and re-hardening).

Each set comprises: 3 ARMSTRONG *Carbide* TOOL HOLDERS, 8 ARMIDE Carbide-Tipped Cutters—4 ARMIDE Red, for machining steel and 4 ARMIDE Gray, for machining Cast iron, brass, bronze, aluminum and non-metallics; with service wrench in a filled steel case. (as illustrated)

ARMSTRONG-ARMIDE Sets are stocked by leading Industrial Distributors in 4 sizes.

Write for Bulletin-C844.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

315 N. Francisco Ave., CHICAGO, U.S.A.

Eastern Warehouse & Sales:

199 Lafayette St., New York

STRAIGHT SHANK

LEFT-HAND OFF-SET

RIGHT-HAND OFF-SET

ARMIDE Red Cutters

SQUARE NOSE | L.H. OFF-SET | R.H. OFF-SET | 80°

ARMIDE Gray Cutters

SQUARE NOSE | L.H. OFF-SET | R.H. OFF-SET | 80°

Positive action of BARRETT TYPHOON CENTRIFUGAL WASHERS provides for quick, thorough parts cleansing

In these efficient centrifugal machines the washing solution enters the top of the whirling load under valve control. The operating principle—being that of a typhoon—gives the washing solution a spraying, swirling, and surging action which thoroughly permeates the contents. During this action, centrifugal force creates hydrostatic pressure within the basket. That proportion of the deluge going to the bottom is forced up the side and out carrying off the contaminated fluid.

A thorough, quick cleaning is definitely assured by flowing sequence. Two or more liquids may follow, making it possible to wash, rinse or provide any further treatment as required.

Several Barrett installations involve the use of four machines operated by one man who loads and unloads in three minute cycles. Washing time is only one minute. Another type of set-up provides for recovering oil, washing, drying, and coating with rust-proofing material.

As in all Barrett Centrifugal machines, provision is made for convenience and safety of operation.

Send at once for details of Barrett Typhoon Washer

Barrett Centrifugal Washer — made in capacities from 13 to 38 cu. ft. per hour. Each size, depending on condition, will perform at the rate of 20 duty cycles per hour.

THE LEON J. BARRETT CO., WORCESTER, MASS.

Designers and Builders of Centrifugal Machinery

Use the IMPROVED HOBART ARC WELDING ELECTRODE
Write for Particulars
HOBART
"Simplified" arc welders
"One of the World's Largest Builders of Arc Welders"
HOBART BROTHERS CO., Box A.M. 10-12 TROY, OHIO

DIES TAPS

GEO MET RIC

Right in the Lead

THE GEOMETRIC TOOL CO.
NEW HAVEN 15, CONN.

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

LYNN Precision Self-Indexing Tool Post Turrets

for Lathes from 9" to 30" Swing

Both tee bolt and bolt circle mounting with special base for all types of screw machine and turret lathe mountings. 4 separate operations in succession with one set-up. All working parts enclosed.

Write for information

LYNN MFG. CO. 224 ELROY STREET, Minneapolis 8, Minn.

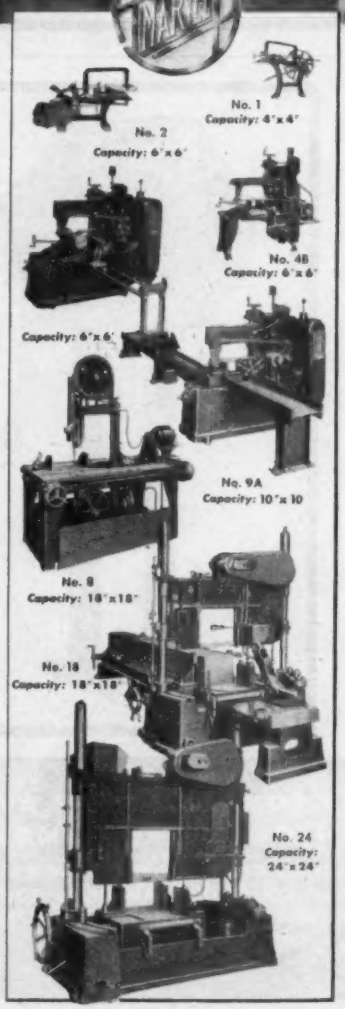
GRINDING WHEEL DRESSERS

Desmond Cutter *Desmond Hex Dresser*

We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
Canadian D-S Mfg. Co., Hamilton, Ont.

ARMY E NAVY



The MARVEL No. 8 does this job with ease— fast and economically

The Denver Shops of the Denver Rio Grande and Western Railroad, like numerous other railroad shops, have found the No. 8 MARVEL Universal Metal Cutting Band Saw Machine the ideal metal sawing machine. The illustration shows the cutting of floating rod bushings into three equal sections. Normally a difficult and expensive operation, this job is done on a No. 8 MARVEL Band Saw with ease, speedily and economically. No special tools, jigs, or high mechanical skill are required.

In railroad shops, as in many machine shops, tool rooms, and fabricating shops, there is a real need for a UNIVERSAL metal sawing machine that will cut the smallest, most delicate pieces as well as solid blocks 18" x 18". The No. 8 MARVEL Band Saw Machine answers these requirements and in addition will mitre, trim, notch and make re-entrant cuts.

The No. 8 MARVEL Metal Band Sawing Machine is but one machine in the MARVEL system. There is a MARVEL Metal Cutting Saw (either hack saw or band saw) for every shop's need. A local service engineer is available to survey your work without cost or obligation. He will recommend the best saw for your work, supplying accurate cost and production data. Write us asking for a call by a MARVEL sawing expert. A complete catalog is also available.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. BLOOMINGDALE AVE. CHICAGO 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

PALMGREN ANGLE VISES

DRILLING
MILLING
GRINDING
FILING
FITTING
MARKING

Solve Difficult Angle Jobs

- ★ For Tool Room — Production Line — Bench.
- ★ Speed up work — End Makeshift Methods.
- ★ Quick Accurate Setups at any angle.
- ★ Sturdy Longlife Construction.
- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel—Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.

Write for circular 8345 "101 Angle Operations" and complete line of PALMGREN Vises.

CHICAGO TOOL & ENGINEERING COMPANY
Mfrs. of PALMGREN PRODUCTS for over 25 years
8345 South Chicago Avenue, Chicago, Ill.

PRECISION WORK AT ANY ANGLE

FAST PRODUCTION WITH PROTECTION!

Plant experience proves that caution or hesitation in feeding presses disappears when operators *know* their hands are safe.

Since Junkin-equipped stamping presses eliminate the dangers of torn, lacerated or smashed hands, actual speed-up of production follows.

Junkin Safety Guards also reduce compensation costs and lost man-hours. Write for free booklet and other valuable information today! Junkin Safety Appliance Co., Inc., 936 W. Hill St., Louisville, Ky.

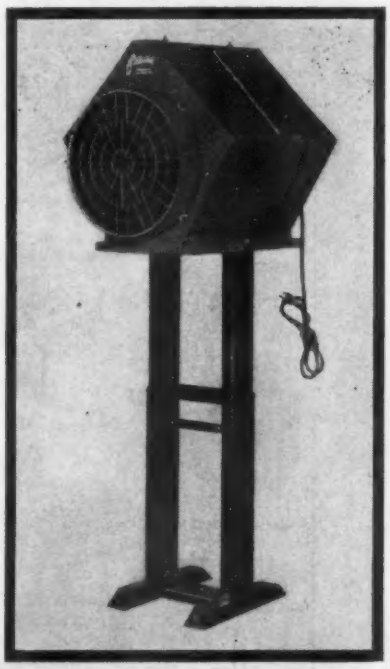
FREE BOOKLET!

JUNKIN SAFETY GUARD

Filtaire

COMPACT
PORTABLE
ECONOMICAL

NO. 2 DUST COLLECTOR



Hundreds of Filtaire collector installations have proven their efficiency and economy, and have also proven their adaptability to dozens of types of dust collecting jobs in shops throughout the country.

If you do dry grinding or polishing, if your processing creates dust that floats in the air—it will pay to install a Filtaire at every trouble spot.

The No. 2 Filtaire Portable Dust Collector soon pays for itself, because it eliminates the dust that often ruins machine tools, fans, pumps, bearings, etc. It *recirculates* warm air instead of expelling it from the shop, so you save on fuel bills, too!

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE.
NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — WALTHAM CUTTER SHARPENERS

Please send me Bulletin No. 444 which describes the Filtaire in detail.

A.M.

Name..... Title.....
Company.....
Street.....
City..... State.....

CONTRACT WORK

PLANT EMPLOYING 200 PEOPLE HAS PRODUCTION TIME OPEN

- CENTERLESS
- TURRETS
- MILLERS
- SHAPERS
- GRINDERS
- LATHES
- SUPPORTING EQUIPMENT

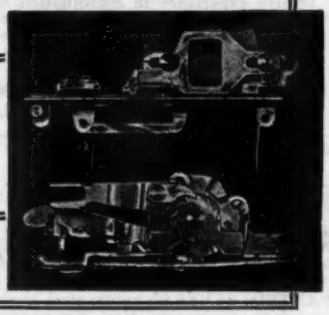
Over 200 Machine Tools

BERGEN MACHINE & TOOL CO., INC.

189 Franklin Ave., NUTLEY 10, N. J.

STAMPINGS AND ASSEMBLIES

"GREATER SAVINGS WITH GREIST"



We can make short or long runs in any metal. Our modern equipment and methods, backed by 50 years of experience, are your guarantee of satisfaction. We are also fully equipped to make

SCREW MACHINE PRODUCTS
TOOLS, DIES, JIGS, FIXTURES

Quality work by skilled mechanics is assured. Send your blueprints or samples today.

THE GREIST MFG. CO.

546 BLAKE ST. NEW HAVEN, CONN.

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER STEEL PRODUCTS CO.

1103 E. 23rd St. INDIANAPOLIS, IND.

CONTRACT WORK—

We can build machines and parts, special tools and fixtures of all kinds to your specifications and design. Skilled workmen and modern equipment are your guarantee of satisfaction. The design and building of wire and ribbon stock forming machines are our specialty.

We solicit your blueprints or samples for quotation. No obligation of course.

THE A. H. NILSON MACHINE COMPANY

Bridgeport, Conn.

HAMMERED FORGINGS

Gear Blanks, die blocks, crankshafts, forged weldless rings, spindles, forgings of any shape or size.

Forgings machined and/or heat treated. Immediate deliveries.

BISON FORGE COMPANY

115 MANITOBA STREET
BUFFALO 6, N. Y.

HIGH-PRODUCTION MILLING-DRILLING-GRINDING

24 hr. service on

TOOL AND CUTTER GRINDING

DUDLEY F. FASOLDT & SON

PROSPECT HEIGHTS RENSSELAER, NEW YORK

MACHINE SHOP WANTS DEFENSE WORK

SCREW MACHINE, LATHE, MILLING MACHINE, POWER PRESS, JIGS AND FIXTURES

FREEPORT MACHINE WORKS, INC.
124 East Sunrise Highway, Freeport, N. Y.
New York Office
16 East 52nd Street, New York 22, N. Y.

GENERAL MACHINE WORK

Lathe, Mill, External and Internal Grinding, and Drill Press Equipment. Tool shop work or precision production. Low time rate or job estimates.

Old, Established Firm, started during last war

THE GILBERT-BAKER-MIDLAM CO.
Dept. AM, DAYTON 2, OHIO

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM-TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery

J. & S. TOOL CO.—477 Main St.—E. Orange 1, N. J.
(Makers of J.&S. Radii & Angle Dressing Tools)

WIRE AND METAL SPECIALISTS

In round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY

Plating and finishing.

EASTERN TOOL & MFG. CO.

BLOOMFIELD, N. J.

REBUILDING

LET US REBUILD AND MODERNIZE YOUR MACHINE TOOLS

Our Methods of Rebuilding are similar to the Methods used by Manufacturers of New Machine Tools. Each Machine is Disassembled—Castings—Replaned — Hand-scraped — Spindles Reground and Bearings Refitted. All Worn-out Parts Replaced — including gears — Re-Lined and Machines Run in and Tested under Load.

We therefore are in a position to guarantee accuracy for our Rebuilt Machines to be Similar to new Machines.

We will design and build your Jigs and Fixtures.

VOLYN MACHINE TOOL WORKS, Inc.

149 BROADWAY, NEW YORK 6, NEW YORK

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.

GENERAL PATTERN WORKS
2233 Ruck Street Cincinnati, Ohio

(Position Wanted)

FIELD COORDINATOR and CONTACT WORK

Young man with experience in field contact and coordination work seeks opportunities for his abilities. 6 years experience in instrument shop and inspection; 3½ years as coordinator for large instrument and manufacturing company. Extensive experience in coordination of purchasing, production, sales and service. Knowledge of Machinery, Heat Treat, and Control Equipment. Desires territory working out of Philadelphia.

PW-942, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

POSITIONS VACANT

WANTED: Mechanical Engineer with experience in welding design, to work in engineering and sales promotion. Splendid opportunity for the right man. Address P. O. Box 247, Middletown, Ohio, and state qualifications and salary expected.

WANTED: SEVERAL mechanical engineers and machine designers. Men experienced in designing precision machine tools preferred. Permanent positions with old established company whose products are recognized standards of quality. Location Pennsylvania. P-943, American Machinist, 330 W. 42nd St., N. Y. 18, N. Y.

MANUFACTURER OF centrifugal pumps and steam turbines has position available for man experienced in this line to assist in the supervision of machine shop. Requirements are thorough knowledge of machine shop practices and ability to eventually assume entire shop supervision. This is an old established business with good working conditions under young and progressive owner management. Now planning for after war business. Give details of qualifications and state starting salary desired. Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Indiana.

ENGINEERS, MECHANICAL draftsmen and detailers. Midwest manufacturer desires several engineers, mechanical draftsmen and detailers with heavy or excavating machinery experience for design and detail work leading to permanent engineering positions with responsibilities. Excellent post-war opportunity. WMC rules apply. P-955, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MECHANICAL ENGINEER—Old established company now converted to pre-war production (Essential Products) has openings for mechanical engineer with some machine design factory layout, and installation experience. Excellent future possibilities. Give complete details of personal qualifications and work history in letter of application. Address P-956, American Machinist, 330 W. 42nd St., New York 18, N. Y.

MECHANICAL ENGINEER for development work on small pumps. Experience in desig and manufacture of same required. Knowledge of combustion and domestic boilers is desirable. Plant located in southeastern Massachusetts. Salary dependent upon ability and experience. Reply will be held in strict confidence. P-961, American Machinist, 330 W. 42nd St., New York 18.

(Continued on page 338)

CHIEF ENGINEER
Post-War Opportunity

Long-established, financially sound, manufacturer wood pencils, mechanical pencils, fountain pens, allied products, New York area, requires competent engineer to organize and supervise product engineering; process and methods; tool, die and special machine design; development, tryout and improvement of equipment; tool and machine shop operation. Preferably man with tool or machine shop experience who has worked as designer of tools and special machinery. No conversion problem. Write giving complete data on experience, education, availability, compensation. Confidence will be respected.

P-941, American Machinist
330 West 42nd St., N. Y. 18, N. Y.

ASSISTANT SUPERINTENDENT
Manufacturing

Well established medium sized Chicago firm, for years a leader in design, manufacture and sale of products applied to electric power installation, offers an excellent opportunity for permanent employment.

Qualifications—

About 32 to 38 years of age.

Educational training equivalent to University course in Administrative-Mechanical Engineering.

Representative experience in Metal Trades Manufacturing work.

Ability to select, train and supervise all types of manufacturing employees.

Initiative, judgment, resourcefulness and tact in handling problems associated with the manufacture of diversified lines of products.

Our products are now being furnished to war activities and will be in greater demand in peace time.

It is not our intent to bring a person into our employ while he is an essential employee of some other necessary war industry.

All correspondence will be considered strictly confidential.

P-952, AMERICAN MACHINIST
520 North Michigan Ave. Chicago 11, Ill.

WANTED

SHOP SUPERINTENDENT

for a manufacturing plant, employing one hundred and fifty people, building machine tools, special machinery, jigs, fixtures and contract work. State full particulars, giving personal information, as to age, religion, etc. and experience on products manufactured by previous employers.

P-958, American Machinist
330 W. 42nd St., New York 18, N.Y.

WANTED

DESIGN ENGINEER

To take charge of small drafting room in a manufacturing plant of approximately one hundred and thirty men. Plant manufactures machine tools, special machinery, jigs and fixtures. New designs and developments required as well as designing of new tools and fixtures and redesigning present units. Applicants please state age, personal information and experience.

P-957, American Machinist
330 W. 42nd St., New York 18, N.Y.

OPPORTUNITY

60-year young firm with enviable record as builders of a varied line of light to medium weight machinery has opening for man of broad experience to head up its design and development department.

This man is probably about 40 years of age and has good working knowledge of pattern shop, machine shop and foundry practice; preferably has job shop experience in designing and building machinery which can be successfully marketed.

He is interested in making a worthwhile, lifetime connection with pleasant, agreeable associates in a modern shop situated in a Southern Michigan city having excellent schools and college. Salary dependent upon ability and experience of applicant. Your reply will be held in strict confidence.

P-948, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

WANTED

MACHINE DESIGNERS

Experienced on the design of special machinery. Excellent opportunity for first class men interested in steady positions in New England.

Only men 35-55 with a record of successful achievements will be considered. In replying furnish information preliminary to a conveniently arranged interview.

P-940, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

Wanted
FACTORY SUPERINTENDENT

For plant operating foundry, machine shop, steel fabricating and assembly departments, with intimate knowledge of machinery and methods used in these processes.

Company manufactures diversified products for three essential industries. Present employment over 300, normal peacetime employment 200. Strong, progressive company with bright future, located in Tennessee Valley Area.

Will wait a few months for the right man who must be a "go-getter".

P-951, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

WANTED

Research and Development Engineer

Connecticut company manufacturing screw machine products, wire forms, stampings and metal specialties wants man with engineering background to undertake and direct development and design of new products. Practical knowledge of materials and tooling essential. Age 35-45. Write stating age, training, experience and salary required. Address

P-939, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

(Additional Employment Advertising on page 338)

"FALK" for DEPENDABILITY in Rebuilt Machinery

OUR INVESTMENT IS YOUR SECURITY

"FALK" STOCK — A modern stock, with every item owned by "FALK" and in our warehouse or enroute. Shipments can be scheduled because "FALK" owns the machines. "FALK" critical inspection is given to every stock item. —Your inspection is welcome under ideal conditions for selecting machine tools.

"FALK" FACILITIES — Modern facilities to operate, rebuild and inspect used machine tools are provided to assure successful operation. Experienced personnel under supervisors with years of experience in our organization.

GOOD BUYS FOR THE MODERN SHOP* — IMMEDIATE DELIVERY

SHEARS

#372 Niagara, 72" x 10 ga.
#672 Niagara, 72" x 10 ga.

PRESSES

#4 Bliss D.C. B.G. Forging 4" stroke.
#4½ Bliss D.C. B.G. Forging 4" stroke (2).
#4½ Bliss 3 column B.G. 3" stroke
#5 Bliss D.C. B.G. Forging 3" stroke.
#74½ Bliss S.S. geared, 2" stroke.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
Vertical, 48" Gisholt.
Vertical, 52" and 60" Colburn.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".

DRILLING MACHINES

Weigel 22" B.G., Sl. Hd., tapping, P.F.
Superior 26" B.G., Sl. Hd., tapping, P.F.
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Leland Gifford 2 spindle.
Woodward & Rogers 6 spindle.

RADIAL DRILLS

5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
7' Arm 13" Col. Cincinnati Bickford
4' Arm 11" Col. Cincinnati Bickford

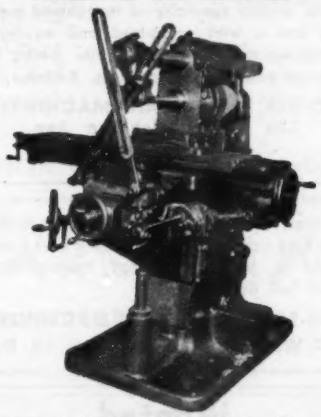
MULTIPLE DRILLS

Fox #15H 54 spindle hydraulic feed.
Fox #D-31 24 spindle motor drive.
Natco #D-5 8 spindle #1 M.T.

GRINDERS

16" Heald Rotary Surface Grinder.
12" Persons-Arter Rotary Surface Grinder.
12" Heald Rotary Surface Grinder equip with 9" Dia. Perm. Mag. chuck.
#2 Cincinnati Centerless Grinder, Filmatic.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump.
Oliver Model 51 Drill Grinder; 1½" cap.
Pratt & Whitney 14x36 model B vertical surface grinder.

MILLING MACHINES



#2 Brown & Sharpe Plain Milling Machine. Range—28 Longitudinal travel. 10" cross travel. 19" Vertical travel. Table working surface 10" x 45".
No. 5 Cincinnati, High Power, Plain, S.P.D.
No. 4 Cincinnati, High Power, Plain, S.P.D.
No. 3 Cincinnati, High Power, Vertical
No. 2 Brown & Sharpe, Vertical, SPD.
No. 0 Bickett Vertical Bench Miller
No. 2 Cincinnati, High Power, Plain.
No. 2 Cincinnati, Motorized, Pyramid Col.
No. 2 Brown & Sharpe, Plain (10).
No. 1½ Brown & Sharpe, Plain (2)
#1 Kempsmith Universal, Cone Drive.
No. 1½ Valley City Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
No. 12 P & W Lincoln Type Production (2).
Ames Precision Universal Bench Mill.
P & W 2" Duplex Spline Miller.
Hall Planetary Thread Miller 24"
No. 8 Lees Bradner Thread Miller.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.*
72"x72"x18' Pond Heavy Pattern, 4 Heads.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x36" Niles-Bement-Pond, Planer Shaper, M.D.

LATHES

South Bend 16" x 6' Motorized Gap Lathe
Putnam 26 x 12 Heavy QCG, arr. for M.D.
American, 16 x 6 Q.C.G. Geared Head
Hendey, 16 x 10 Q.C.G., Turner M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).

SHAPERS AND GEAR CUTTERS

14" Steptoe, M.D.
16" Queen City, M.D.
7" Rhodes Horiz. High Speed, Belt Dr.
26" Cincinnati Triple Geared Belt Dr.
#612 Fellows 36" Gear Shapers, (2)
12" Schuchart & Schutte Gear Hobber.
#3 Barber Coleman Gear Hobber: Serial Nos. 111.

BENDING ROLLS

Bertsch 3" x 3" x 3/8" angle bending roll.
Niagara pinch type 7" roll motor driven.

MISCELLANEOUS

Lakewood High Lift Truck, platform type, 4000# capacity, less batteries.
J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room, all sizes.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Grinding Wheels for #2 centerless 4" face, 20" diameter.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
Niagara #98 Brake & Folder, 72" cap. 14 ga. arranged M.D.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.

HEADQUARTERS FOR POWER PRESSES

The above list, selected from our current stock, is subject to prior sale or subsequent additions. Hence we urge your prompt inquiries on any of these machine tools or others in which you are interested.

Buy from Stock
MACHINERY
Tel. Main 6347-6348

FALK
MACHINERY CO.,

18 WARD ST.
MERCHANTS
ROCHESTER 5, N.Y.

SEARCHLIGHT SECTION

EMPLOYMENT SERVICE

(Continued from page 336)

SALARIED POSITIONS—This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details, R. W. Bixby, Inc., 366 Delaware Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

(additional Position Wanted ads on page 336)

EXPORT EXECUTIVE. Over twenty years experience in every phase of export in the U. S. and abroad. Excellent record of accomplishment, fluent in the principal commercial languages, widely traveled, thoroughly competent and reliable. PW-928, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXECUTIVE 35 years experience—qualified to supervise tool design. Tool room and production as superintendent or assistant to chief executive. First class organizer and systemizer. 12 years with present employer. Desire permanent connection, in a smaller city. Address—A. R. E., 5544 Underwood, Detroit 4, Mich.

EXECUTIVE—Works manager—Superintendent broad manufacturing background. Proven administrative ability. Experience operating plant 3000 employees. Supervision over departments as: manufacturing, operating, maintenance, engineering, production, personnel, labor relations, methods, accounting, laboratory, etc. Desire change for founded personal reasons. Age 42, excellent health. PW-949, American Machinist, 330 W. 42nd St., New York 18, N. Y.

FACTORY EXECUTIVE, 46, with experience as factory manager, superintendent, chief production engineer and chief engineer on product development and design. Will consider position of major responsibility only. PW-959, American Machinist, 520 N. Michigan Ave., Chicago 11.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W. Washington 5, D.C.

WANTED

SALES ENGINEER

Location — Ohio

Progressive engineering and tool manufacturing concern of twenty-five years standing is seeking a qualified tool designer who is, by virtue of experience, capable of heading up engineering sales, covering complete service in tool design, process engineering, production planning, plant lay-out, etc. We have an engineering organization of approximately sixty men and our manufacturing facilities are balanced in a manner to permit the handling of all types of work. This combination enables us to manufacture all tools and equipment which we design, if customer so desires. This is a first-class job for a high caliber man and offers unlimited post-war possibilities. Straight salary, or salary and commission. Give complete chronological record and all pertinent facts in your letter.

SW-932, AMERICAN MACHINIST
330 North Michigan Ave., Chicago 11, Ill.

MANUFACTURERS' REPRESENTATIVE WANTED

for outstanding line of new precision accessories for tool and die makers. Sales opportunity, present and postwar, unlimited. Applicants should know tool and die industry; good distributor contacts helpful. Give details: lines handled, territory covered, etc.

RW-950, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

POLISHING & BUFFING EQUIPMENT SALES MANAGER

Well established midwest machinery builders want manager capable of assuming full responsibility for success of line of Automatic Polishing and Buffing Machinery. Must be familiar with all branches of finishing and preferably have engineering ability. Outline experience last ten years and give age. Confidential. Address

SW-954, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

WANTED

PRODUCTS OR INVENTIONS FOR POST-WAR MANUFACTURE

We will purchase outright or manufacture on a royalty basis, household, automotive, tools, or any specialty of recognized merit. We are a well organized and equipped metal working company. Write giving details of your product or item. Address

BO-953, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

Interested in Purchasing Production machine shop outside New York area with or without present management. Give full details.

BO-960, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

Wanted

HYDRAULIC PRESS for PLASTIC WORK

100 to 150 ton capacity. Platens 20"x20". Complete with pump. Downstroke preferred.

Interstate Machinery Co., Inc.
1439 W. Pershing Road, Chicago 9, Ill.

WANTED 10 PUNCH PRESSES. 35 to 100 ton, OBI, geared or belt driven. Must be in good condition.

Straits Tool & Machine Company
10600 E. Outer Drive Detroit 24, Mich.

WAR CONTRACT CANCELLATIONS ARE COMING SOON

Do you know how to protect your business when your contract is cancelled? Do you know exactly what you will do? "Practical Guide To Termination Procedure" will tell you. It is based upon actual experience gained in filing and successfully settling two hundred fifty eight cancellation claims. Tells you what to look for, what to avoid, what to do, and how to do it. Short, concise, written in simple language especially for the busy executive who does not have time to study lengthy volumes. Avoids legal and accounting expressions. Send Five Dollars by business check or money order and booklet will be sent postpaid for inspection subject to return within 10 days and refund of your remittance

GEORGE W. DAVENPORT, *Contract Termination Counselor*
1445 ELLSMERE AVENUE LOS ANGELES 35, CALIF.

FOR SALE

Garvin 1½" Turret Chucking Lathe. Drawbar. 25 Collets. 6—2 and 3 Jaw Chucks. 7 Nose Pieces. Semi Automatic. Complete.

Garvin 2½" Turret. Hand Feed. Stock Barfeed. Master Collet. Complete.

Hendey Engine Lathe. Q.C. 6'x15"x38 Centers. 3 & 4 Jaw Chucks. Face Plate. Steady Rest.

P&W Engine Lathe 14'x27"x120" Centers. New Compound. Face Pl. 21" Scroll Chuck. Pl. Ch. Rebuilt by Experts. Excellent Condition.

Fox Chasing Bar Lathe. Tail Turret. Cross-slide. 24 Hobs. About 30 extra Tools. Several Hollow Mills. Cuts. Right. Left. Inside. Outside. Threads.

Cincinnati No. 2 Universal Mill. Vertical Head. Good.

Nut Tapper, Treadle Type. 4 Spindle. Cutting done in oil bath. Slot Feed.

Round Bar Straightener. ⅜. Like wire straightener. Takes Kinks from Rounds.

JAY SALTER
534 S. Goodman St., Rochester, N. Y.

One (1) #1 Barrett Horizontal Cylindrical Boring Machine, with 3¾" bar and 18" center of shaft to base surface, in good condition.

AMES IRON WORKS
Oswego, New York

Pond Planer 60" x 60" x 20' table, box base, 4 heads, less motor, fine condition, $4,000.00.
4-Nat. Acme No. 55, 4 spindle Screw Machines 1-5/8", threading, tooling, motors, serial 9000 plus, good, $1,200.00 each.
4L Gisholt new 1928, reconditioned 1942, $4,000.00.
3-Davenport 5 spindle 9/16" screw Machines, $1,200.00 each.
4-J & L Turrets with motors 2 x 24, 3 x 36, $600.00 each.
Niles 4" horizontal Boring Mill, compound table, $1,200.00.
36" x 9' centers Plain Change Lathe, $1,000.00.
Potter Johnson 5A-6A Automatics.
Other Tools.

GENERAL MACHINERY & EQUIPMENT CO.
180 S. 15th ST. HARRISBURG, PA.

WANTED:

VERTICAL SPINDLE SURFACE GRINDER, 18" TO 22" WHEEL, APPROX. 90" TABLE TRAVEL.

W-924, American Machinist
330 WEST 42nd STREET
NEW YORK 18, N. Y.

WANTED ROLL FORMING machine, 8 to 10 1½" diameter double spindles, with water pump, straightening head, and automatic cut-off. Must be in good condition.

STRAITS TOOL & MACHINE CO.
10600 E. OUTER DRIVE, DETROIT 24, MICH.

HILL-CLARKE
Modernized
CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH

SIZES AVAILABLE

10x36	14x36	16x30
10x50	14x50	16x50
10x72	14x72	16x72
10x120	14x96	18x96
		18x168

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke Patented Multiple V-Belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO. CHICAGO U.S.A.

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD **CHICAGO 6, ILL.**

MILLING MACHINES

2 Jackson Vertical Miller, M.D.
3H K & T Sliding Head Vertical Millers, M.D.
1—5' American triple purpose plain radial drill, motor on arm.
4 Cincinnati High Power Plain Miller, S.P.D.
4 Cincinnati Vertical Miller, H.P.S.D.
6' American Triple Purpose Plain Radial Drill, M.D.

GRINDERS

Lees Bradner Gear Grinder.
Simplicity Piston Grinder.
12" x 96" Landis Plain, S.C.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
4—36" B & S Automatic Gear Cutter.
Lees Bradner Gear Grinder.
6 Fellows Gear Shaper, Cone.
2 Pfauter Gear Hobber.
36" Gould & Eberhardt Automatic Gear Hobbing Machine, Motor driven.

PLANERS

42" x 42" x 20' Cincinnati Hypro, 4 Heads, D.C. drill.
24" x 24" x 6' Gray Planer.
26" x 26" x 8' Woodward & Powell, 2 Hds.

MISCELLANEOUS

14" Niles Slotter
4 La Pointe Broach

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second St., Cincinnati, Ohio

MILES' HIGH GRADE TOOLS

Automatic, 1¾" Gridley 4 spindle
Automatic No. 0 Brown & Sharpe
Automatic, 4½" Gridley "H" 4 spdl. chucking
Automatic, 7" Baird 6 spdl. chucking
Brake, 10' x 10 ga. Dreis & Krump leaf
Balancer, Micropoise flywheel
Balancer, 44" Norton
Broach, No. 3, J. N. Lapointe double
Broach, No. 2L Lapointe hydraulic
Drill, 20", 21", 24" Cincinnati Bickford
Drill, with tapping attmt. 25" Weigel
Drill, Nos. 2 & 3 Henry Wright sens.
Drill, Nos. 11 & 12 Natco multiple
Drill, 3¼' American radial
Drill, 4' Western radial, Timken bearing
Drill, 24", No. 10 HO Baker hydraulic
Drill, 24", No. 314 Baker
Gear Hobber, No. 1 Lees Bradner
Gear Hobber, No. 16 HS Gould Eberhardt
Gear Lapper, 8" Red Ring
Gear Generator, 15" Gleason spiral bevel
Gear Tester & Lapper, 18" Gleason bevel
Gear Chamferers, Pearless & Lipe
Gear Cutters, 36" & 48" Brown & Sharpe
Grinder, 12" x 36", 16" x 36", 16" x 52" Landis
Grinder, 16" x 48" Landis crankpin
Grinder, No. 72 Heald sizing internal
Grinder, 20" Gardner semi-auto. disc.
Grinder, 6" x 22" No. 78, W. & M. Surface
Grinder, 8" x 24" LaSalle surface
Grinder, 12" x 24" Diamond surface
Grinder, 24" Cincinnati face milling cutter
Grinder, 6" x 20", No. 16 Brown & Sharpe
Grinder, No. 13 Brown & Sharpe T. & C.
Grinder, 6" x 18" Monarch surface
Hammer, No. 2B Nazel air, forging
Honing Machine, No. 211 Barnes
Lapper, No. 10U Norton
Lathe, Turret, No. 3B Foster
Lathe, Turret, 22" Libby
Lathe, Turret, 26" Libby, 4¼" or 7¼" hole
Lathe, Turret, 36" Bullard vertical, Rap. Pro.
Lathe, 14" x 6" Hendey
Mill, 42" Bullard vert., 1 plain, 1 turret head
Mill, 3" Universal horiz. boring
Miller, No. 2 Heavy Brown & Sharpe
Miller, No. 2 Van Norman duplex
Miller, No. 2 Brown & Sharpe vert.
Miller, No. 3 Reed Prentice vertical high speed
Miller, 30" Newton Continuous rotary
Miller, No. 1 Davis Thompson duplex
Miller, Type C Hall Planetary thread
Miller, Size 3 Turnmillers
Miller, Types 10 & 45 Productomatic
Miller, 48" Oesterlein tilted offset
Miller, No. 2 Kempsmith universal
Planer, 24" x 24" x 5' Gray
Planer, 36" x 36" x 16' Cleveland openside
Press, 34", No. 174 Consol. gap dbl. cr.
Press, 28", No. 71 Swaine double crank
Press, No. 53 Toledo straight side
Press, No. 6 Waterbury Farrel openback
Press, No. 33 Consolidated arch frame
Press, No. 3 Standard screw type
Riveter, Nos. 2A 5½B & 7B High Speed
Roll, No. R60 Yoder fender crowning
Roll, Forging, No. 1 Ajax Evans
Sprue Cutter, Model 1 Tessmer
Saws, 4", 7" & 8" Higley cold
Upsetter, 3" Acme steel body
Welder, 80 KVA Taylor Winfield butt
Welder, 7 KVA Winfield automatic spot

SEND FOR COMPLETE STOCK LIST

MILES MACHINERY CO., SAGINAW, MICH.

FOSDICK 3½' Radial Drill, S.P.D.
POTTER & JOHNSTON 15" Shaper.
CIN.-BICK. 28" Drill Press, P.F., T.A.
J & L 8"x36" Turret Lathe, MD.
MILWAUKEE No. 2-B Double-Over-Arm Plain Miller, MD.
Available immediately. Also many other tools
ALEX ZEEVE & COMPANY
2269 Woolworth Bldg. New York 7, N. Y.

900 lbs. assorted drills, taps, reamers and cutters for sale. 90% high speed. $1.00 per lb.

PAUL'S MACHINERY CO.
6111 Vermont Detroit 8, Mich.
Tyler 76300

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MINA MEMBER
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

EXCEPTIONALLY FINE MACHINE TOOLS

AUTOMATICS AND SCREW MACHINES

***2—8" Bullard 6 Spindle Mult-au-matics**
***2—7" Baird 6 Spindle Automatic Chuckers**

⅞" Model G 4-Spindle Gridley
2⅝" 4-Spindle Model G Gridley
1¾" Cleveland Single and Four Spdl.
*3—#19 Brown & Sharpe Full Automatics
*1⅝" National Acme Model C, 5 Spdl., new in '30
*1¼" National Acme Model G, 4 Spdl., 1¼" Gridley "F," 4 spdl.
1⅞" Acme Turret Lathe, power-fed turret
*2—6¼" Univ. Gisholts, 48" O.D.
1¾" Model G 4 Spindle Gridley
*2G Morey Screw Machine, new in '42

GEAR MACHINERY

*No. 17 Barber Colman Hobber, motorized
*12" Fellows Gear Shaver, new in '43
*2—#6 Fellows Gear Shapers
*4—#7 Fellows Gear Shapers
*#3 LaPointe Screw type Broach
2—11" Gleason Bevel Gear Cutter
36" Brainard Universal Gear Cutter (automatic)
Fellows Gear Burnisher, heavi-duty
3 x 36 Brown & Sharpe Gear Cutter

DRILL PRESSES

*Footeburt Drill Press, Single Spindle with multiple heads (four) #4 M. T.
*Drill Press, 2 Spindle, 2 M.T.
Barnes, #3 M.T., complete, new 3 jaw
*6 spdl. #4 and 5 M. T.
*Moline Hole hogs #3 and 4
3" Canedy-Otto Radial Drill
*#1, 2, 3, 4 and 5 M.T. single and multiple spindle

GRINDERS

*2—Bryant Chucking Grinders, #12 and #20
*2—12 x 18" Brown & Sharpe External
2 and 3 H.P. Double End, New
*10 x 24 Norton O.D., nine years old
*2—Sav Way Internal Grinders with excello spindles, motor, hand feed, rebuilt and guaranteed.
*#1 Brown & Sharpe Universal Grinder
*#2 Bath Universal Grinder

MILLING MACHINES

2—Lees Bradner Thread Millers
Osterlein Rotary Mill 48"
#3 Brown & Sharpe Horizontal
*#3 Cincinnati Universal
*#2 Brown & Sharpe Vertical
*#2 Brown & Sharpe Universal
*#3 Heavi-duty LeBlond Universal
*12—#4 Burke Horizontal, especially set up for making end mills
Combination Milling & Drilling Machine, 2 Drilling Spindles, Milling Spindle
*#4 Lucas Horizontal Boring Mill, 3" bar
*5" Newark Horizontal Boring Mill

TOOL ROOM LATHES

*Spitz 14" x 36" Bench Lathe
*American 22 x 6', quick change gear
New Haven 18" x 8' loose change gear
*Davis 18" x 8', quick change gear
50" x 11½' loose change gear lathe
9" Porter Cable Production Lathe
*14" Faye Automatic, 3 heads
18 x 60" Crankshaft Lathe

METAL WORKING MACHINERY

23" throat circle shear
60" throat circle shear
Metal cutting verticle band saw, large
8' hand leaf brake

Heavy duty double end punch and shear, equal to Ryerson #7, cuts 1" thick steel plates, A-1 condition, 30" throat depth both ends.
Double End Punch and Shear, 12 x 12 die space.

Oram, 2" stroke double end punch and shear

PUNCH PRESSES

*Elmes Hydraulic 190, 250, 300, 350 ton
2—30 ton st. back presses

MISCELLANEOUS

*16" Smith & Mills Shaper, A-1 condition
2 Car Wheel Boring Machines 24" and 48"
Hanna Rivetor, 104" throat depth, excellent condition
*60 to 500 amp. Arc Welders, portable and stable type
1½" Acme Bolt Threader, double spindle
*48" x 8' F & F Machine Planer
24" Beader and Slotter
*Schraner Polisher & Finisher, piston lapper
2 Spdl. drum type tapper, size ⅜"
Brand new "Clark" Rockwell Hardness testers
*Pilton Crane Slotter, 6" stroke
*Tinius Olsen Horizontal Balancer & Tester
96 to 1 Palmer Bee Speed Reducer
500 GPM Dayton Turbine Pump
50 lb. Mayer Trip Hammer
6 H.P. Gas Engine 1450 RPM
⅜" Riveting Machine, revolving table

*Machines marked with asterisk are all complete, brand new motors, controls, and are in excellent condition. They may be inspected under operation.

Paul's Motor and Machinery Supply Co.

MDNA MEMBER

6111 VERMONT AVE., DETROIT 8, MICH.

PHONES: TYLER 763000-2 GET MY PRICES BEFORE YOU BUY OR SELL

ST. LOUIS' Headquarters For Good Used Tools, Offers:

ROCKFORD 24" S.P.D. Shaper
CLEVELAND 36" x 8' Openside Planer
MUELLER 4½" Gear Box Drive Radial Drill
CIN. 36" x 36" x 10' 3-H.D.S. Planer D.H.
BARNES 4-Sp. Geared Camel Back Drill
BULLARD 24" M.D. Vert. Turret Lathes (3)
CIN. 48" Pl. Auto. Miller M.D.
NILES 12" Vert. Slotter
MILWAUKEE #3-B Vert. Miller, M.D.
BLANCHARD 36" Vert. Surf. Grinder
DIAMOND M. D. Horiz. Surf. Grinder
CLEVELAND 2¼" Bar M.D. Horiz. Boring Mill
BROWN SHARPE #3 Pl. Horiz. Miller
NILES 81" M.D. Vert. Boring Mill 2 HDS.
SMALLEY GENERAL #23-A Thread Miller
AMERICAN 24" x 12' M.D. Grd. Hd. Lathe
Write Us For Any Other Tools You May Want
Let Us Quote On All Machinery Needs.

McDONALD MACHINERY CO.
1531-35 N. Broadway St. Louis, Mo.

IF YOU ARE DOING DEFENSE WORK

Send for Our Latest Circular Covering Bargains in Small Tools Such as Drills, Reamers, Turret Attachments, etc.

DEWITT TOOL COMPANY
173 Grand St. New York City

PRACTICALLY UNUSED WHITING

Overhead Electric Traveling Crane
Totally enclosed for outdoor service
150 Ton Capacity Main Hoist
2-25 ton each auxiliary hoists
5 motor, cab controlled, 3/60/440
Each hoist independently operated by means of separate electric control 30' span

IRON & STEEL PRODUCTS, Inc.
13498 S. Brainard Ave.
Chicago 33, Ill.
"ANYTHING containing IRON or STEEL"

6" x 15" J & L Thread Grinders
No. 5 Cincinnati Plain Mill, S.P.D.
18" Libby with 5" hole in spindle, M.D.

MDNA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N. Y.

FOR SALE
Coulter Diamond Boring Machine

Vertical, single spindle, complete with 5 HP, 440 volt, 3 phase drive with starter and work hold down—can finish bore holes up to 4" dia. by 3" deep. Machine ready to run.

THE OHIO ELECTRIC MFG. COMPANY
CLEVELAND, OHIO

---

2 FAY AUTOMATIC LATHES 14"x32", geared head, arr. for motor drive, less motor. $1250.00 each, FOB trucks Chicago.

SIEGMAN MACHINERY CO.
28 No. Clinton St. Chicago 6, Ill.

Bending Roll, 10' x ⅝" Bertsch Initial Type.
Draw Block, Double, 22", M.D.
Grinder, 10" Bridgeport, Knife.
Keyseater, #3 Cattin, 23"x2", M.D.
Miller, Universal, #3 Cincinnati, M.D.
Miller, Vertical, #3 B. & S., S.P.D.
Miller & Shaper, #14 Cochrane-Bly, Vert., M.D.
Shapers, 20"-24"-32".
Shaper, 36" Morton, Draw Cut.

West Penn Machinery Company
1210 Henne Bldg. Pittsburgh, Pa.

FOR SALE

1—AN2-484.5 Magnaflux Testing Machine
1—Bryant #16 Internal Grinding Machine
Both like new—Used less than one year

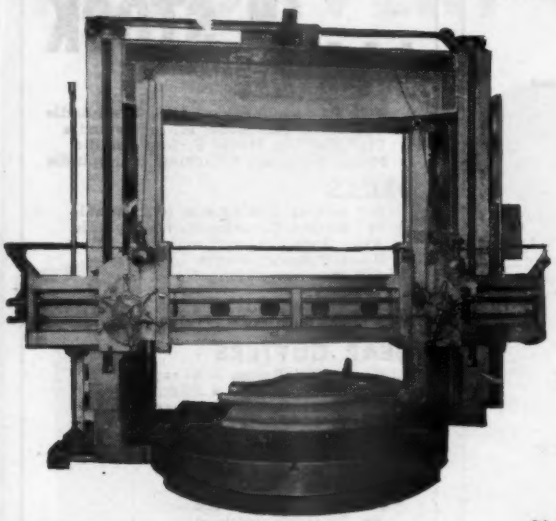
EISEMANN CORPORATION
32 THIRTY-THIRD ST., BROOKLYN 32, N. Y.

BROWN & SHARPE GRINDER

No. 3 Universal belt driven #1673 in excellent condition new operating bargain for cash.

THE CHAS. G. HARRISON CO.
12075 Greenfield Rd. Detroit 27, Mich.

PRICED FOR QUICK SALE!



VERTICAL BORING MILLS

12 FT. BETTS; 2 swivel heads; 4 chuck jaws; Motor Drive with 25 HP A.C. motor;

2—72" COLBURNS, Geared Feeds, Rapid Traverse, 4 chuck jaws, 1 with 2 rail heads, 1 with 2 swivel heads;

51" BULLARD, 2 heads on rail, 50" table.

48" ROCKFORD, 3 spindles, 48" rotary table;

4-spindle ROCKFORD, 38" table.

6" BULLARD MULT-AU-MATIC, 4 Stations, Motor Drive, Serial No. over 14,000. Excellent condition.

8" BULLARD MULT-AU-MATIC, 6 Stations, Motor Drive, with chucks.

GRINDERS

82"x10' 6" FARREL ROLL GRINDER. Grinds rolls up to 34" diameter. 10' between centers, M.D. A.C. motors.

CYLINDRICAL: No. 22 LANDIS, 12" swing, 34" bet. centers.
10"x36" LANDIS, 2"x14½" wheel.
INTERNAL: No. 72 HEALD SIZEMATIC
No. 52 GREENFIELD HYDROILS (2)
No. 60 Heald.
UNIVERSAL: No. 1 LANDIS CYLINDRICAL.
BATH UNIVERSAL.
SURFACE: No. 16A BLANCHARD, M.D.;
No. 16 BLANCHARD, M.D.
15"x15"x96" NORTON; 2 Magnetic chucks.
TOOL & CUTTER: No. 1 W&M.

RADIAL DRILLS

6 Ft. AMERICAN UNIV., 15" col., Box table.
6 Ft. AMERICAN, 14" columns, M.D.
4' AMERICAN, Triple Purpose
4' Fosdick, Box table, 12" col., M.D.
4 Ft. & 3 Ft. Fosdicks.
3 Ft. AMERICAN, M.D. (2)

FLOOR DRILLS

No. 263 BARNES, 28" S.H. Camel Back. Self-oiling, M.D.
No. 242 BARNES, 25", M.D.
25" SNYDER, 36" PRENTICE, 24" BARNES.
25" WEIGEL; 24" CINCINNATI, T.A.
2 SPINDLE FOOTE BURT Heavy Duty.
8 SPINDLE MULTIPLE, M.D., No. 5 M.T.
6 SPINDLE LELAND GIFFORD.

SLOTTERS & SHAPERS

24" BETTS, Rapid Traverse, M.D.
14" NEWTON, M.D.; BETTS, 9" stroke.
72" MORTON DRAW-CUT SHAPER.
24" CINCI. SHAPER, S.P.D. thru gear box.

TURRET LATHES

No. 1-A WARNER SWASEY, M.D., Bar feed.
26" LIBBEY, 7½" hole in spindle
18" LIBBEY, 3½" hole in spindle
JONES LAMSON GD. HD., M.D., 2½"x24".
Nos. 2 & 3 FOSTER; Nos. 2 & 3 WOODS.
No. 2 BARDONS & OLIVER.
21" GISHOLTS, 3½" & 5" holes in sp.
28" NILES BEMENT POND, Gd. Hd.
AMERICAN HAND TURRET LATHE, 1¼" hole in spindle.
No. 6 BROWN & SHARPE.

SCREW MACHINES

No. 2 B & S TURRET FORMER, M.D.
1½" FOOTE BURT SINGLE SPINDLE HYD. FEED, Motor drive.
2⅛" GRIDLEYS 1 SPINDLE (2)
No. 55 NATIONAL ACMES.
9/16" DAVENPORT, 5 SP. AUTO. M.D.
No. 652 NEW BRITAIN CHUCKER.
Nos. 2 & 3 MANVILLE WOOD SCREW MACHINES.

FLOOR LATHES

NEW 14"x6' ROBBINS GEARED HEAD TOOL ROOM LATHES. MTR. IN BASE. NO PRIORITY REQUIRED.

36"x17' AMERICAN GD. HD. M.D.
30"x12' LEBLOND
16"x6' MONARCH, Q.C.G.
16"x6' PRATT WHITNEY, GD. HD.
30' PIT LATHE, Face plate 156".
14"x4' LODGE SHIPLEY.

HORIZONTAL BORING MILLS

8" NILES BEMENT POND, Floor Type, M.D. with motor.
7" BARRETT, Floor Type, Single Pulley Drive.
5½" NILES, Table Type, Table 23"x78", B.G.
5" OHIO SPINDLE, Table Type, 60"x96" table; 4' rotary table; A.C. M.D.
5" DETRICK & HARVEY, Floor Type, No. 6 M.T., M.D.
4" KEMPSMITH, Floor Type; 3½" BEAMAN SMITH.

MILLING MACHINES

PLAIN: No. 5 CINCINNATI, Rect. Overarm; 21x83" Table, M.D.
No. 5-B BROWN & SHARPE, 22½x75" table; M.D.
No. 4 LEBLOND, Heavy Duty.
No. 4 CINCINNATI, Cone drive. Table 16"x68¾".
VERTICAL: No. 3 CINCINNATI; No. 2½-B KEARNEY & TRECKER; No. 1-A MILWAUKEE.
No. 2 BROWN & SHARPE.
THREAD MILLS: No. 3 LEES-BRADNER; 6"x48" and 6"x72" PRATT & WHITNEYS.
PLANER TYPE & SLAB: 42"x42"x13' INGERSOLL SLAB.
42"x36"x8' BROWN & SHARPE PLANER TYPE.
PRODUCTION: OHIO TYPE P, Motor Driven, Table 16"x72".
Timken Bearing Spindle, New 1941.
18" CINCINNATI AUTOMATIC; M.D.; No. 45 Productomatic.
10" PRATT & WHITNEY Semi-Automatic.

PLANERS

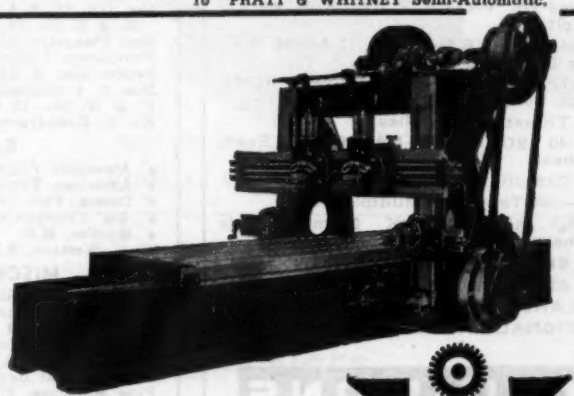
36' Sellers Plate Planer, pneumatic hold-down, motor drive.

DOUBLE HOUSING

60"x60"x18 FT. NILES, 2 HEADS ON RAIL, M.D.
60"x48"x12' GRAY, 4 HDS., M.D. WITH 20 H.P. MOTOR.
44"x36"x12' GRAY, 2 HEADS ON RAIL.

OPENSIDE

44"x38"x15' New Albany, M.D.
42"x40"x13' Patch.
42"x42"x14' Patch.
42"x36"x14' New Albany.
42"x45"x15' Bedford.
42"x45"x15' Lincoln.

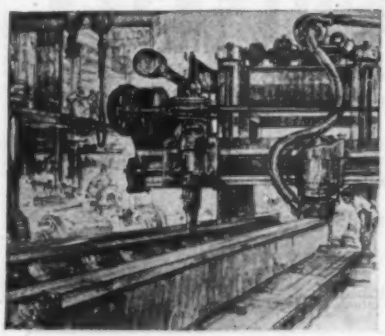


MDNA MEMBER

INTERSTATE Machinery Co., Inc.

1439 W. PERSHING RD., CHICAGO 9, ILL.

ENGINEERED REBUILDING



By Simmons

Every machine listed in this column is in our warehouse at press time.

●

42" BULLARD NEW ERA, 11000 serial
42" N.B.P. Car Wheel Borer
66" N.B.P. Vertical Tire Mill
27" BRIDGEFORD Axle Lathe
29" PUTNAM Axle Lathe
42" PUTNAM Car Wheel Lathe
2½" Bar CLEVELAND Horizontal, Table Type Boring Mill
2¾" Bar LUCAS Horizontal, Table Type Boring Mill, M.D.
5" Bar DETRICK-HARVEY Floor Type Boring Mill
4' HAMMOND Sensitive Radial Drill
7' AMERICAN Universal Radial Drill
BLANCHARD No. 16 Surface Grinder
33" x 9" Q&E Spur Gear Cutter
No. 2 CLEVELAND Plain Miller
No. 3-B MILWAUKEE Plain Miller
No. 5-B B&S Plain Miller
No. 6 BECKER Vertical Miller
No. 10 N.B.P. Heavy Vertical Miller
24"x24"x12' INGERSOLL Planer Miller, M.D.
30"x30"x10' NEWTON Slab Miller
24"x24"x6' WHITCOMB Planer, one rail head, 230 Volt, D.C.
30"x30"x12' N.B.P. Planer, two heads, 230 Volt, D.C.
36"x36"x12' POWELL Planer, 4-heads A.C. Motor Drive
48"x48"x20' PATCH Planer, 4-heads, 230 Volt, D.C.
48"x48"x24' N.B.P. Planer, 3-heads, A.C. or D.C. Motor Drive
72"x72"x18' N.B.P. Heavy Planer 4-heads, 230 Volt, D.C.
60" Throat L & A Shear
RT-40 SCHULTZE-NAUMANN Beam Shear
5" Capacity U.E.F. Alligator Shear
72"—105-Ton L&A Multiple Punch
6"x⅝" SOUTHWARK Double Angle Shear
12" SELLERS Crank Slotter
20" SELLERS Crank Slotter
2" LANDIS Pipe Threader
6" BIGNALL-KEELER Pipe Threader

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.
1759 North Broadway, Albany 1, N. Y.
N. Y. Office: 50 East 42nd St.

CLOSEOUTS

BORING MILLS
VERTICAL
66", 120" Niles
42" Bullard, turret head, swivel head
54", 62" Colburn, M.D.

HORIZONTAL
2½" Universal, Binsee
4" Dietrich & Harvey Floor, M.D.
4", Binsee, 4½" Bement-Niles

TURRET LATHES
No. 2A, 3A W. & S., 4½" hole
26" Libby 7⅛" hole, 18" Libby, 3⅛" hole
24" Gisholt, 6½" hole
Foster Nos. 4, 5, 6, 1B, M.D.
W. & S. Nos. 2, 4 Universal, M.D.
J. & L. 2¼x24", 3¼x36"
Acme 3¼x86" grd head

GRINDERS
No. 50, 55, 60 Heald
P. & W. 14", 18", B.B. Vert. M.D.
Blanchard 26", 30", M.D.
Modern 12x48", M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 55, 70, 72A Internal, M.D.
Norton 50" x 28', M.D.
Gardner 72" Disc, M.D.
Landis 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.

LATHES
14"x6' Sebastian Grd Head
48"x12' Harrington Gap, Sld Bed.
McCable 26-42"x14'
26"x24' Putnam 3 step cone, D.B.G.
20"x12' Boye & Emmes, 3 step cone, D.B.G.
20"x14' Rahn-Larmon, raised to 24"
16"x8' Lodge & Shipley Grd Hd, taper M.D.
14"x6' Hendey, tie bar, taper
14"x6' Mulliner, taper, collets
9" LeBlond Automatic

AUTOMATICS
New Britain 1⅝"x7" 6 spindle, Timken bearings.
Cleveland Model A, ½", ⅝", 1¼", 2"
Cleveland Model B, 1", 2"
Gridley 1¾", 2¼", 4 spindle
Cleveland ⅞", Model M, 4 spindle
Gridley 4¼", single spindle, M.D.
B. & S. Nos. 00, 0G, 2, 2G
P. & J. No. 6A, M.D.
National-Acme Model C, 1⅝", 5 spindle, M.D.
No. 1 Petermann

GEAR CUTTERS
No. 3, 12 Barber-Colman Gear Hobber
No. 6 Fellows Gear Shapers
B. & S. Nos. 3-26", 4-36"
Gleason 11" Bevel

MILLING MACHINES
No. ½ Van Norman
10" P. & W. Automatic
No. 2A Milwaukee, S.P.D.
No. 3S Cincinnati, S.P.D. rapid traverse, M.D.
Nos. OY, 1Y, 3, 4, 5, B. & S. Plain & Univ.
B. & S. No. 12, 13, 13B
Hall Planetary Model D Thread Miller
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 3, 4 Cincinnati Vert.
P. & W. No. 12 Profiler, M.D.
No. 2—Kent-Owens

RADIALS
4' American Triple Purpose
8' American Triple Purpose, M.D.
5' Dreses, Full Universal
3', 3½' Cincinnati-Bickford
4' Mueller, M.D.
4', 5' Western, S.P.D.

MISCELLANEOUS
6 spindle Avery Drill, 15" overhang
300 ton coining press, McCabe ½" Flanger
Rochester No. 5B High Speed Hammer
Pels 6' Throat Punch, Pottstown Tappers
P. & W. 6" Vert. Shaper
Marvel Metal Band Saw, M.D.
Pipe Machines, 2", 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
No. 30 Nateo Multiple Spindle Drill
150 ton United Steam Hammer
Thompson-Gibbs Spot Welders 17 KVA
Anderson Tapper, No. 23A, Quickwork Rotary Shear
6x80" Pratt & Whitney Thread Miller

AARON MACHINERY CO.
MDNA MEMBER
45 Crosby St.
New York 12, N. Y.

. . . IN STOCK

AUTOMATICS
9/16" Davenport Model DA, five spindle
⅞" Cleveland Model M, four spindle
1¾" Gridley Model F, four spindle
Model H Gridley Chucking, four spindle

DRILLS
24" Barnes Camelback, four spindle
20" Barnes Camelback, two spindle
Avey Sensitive, four spindle
No. 310 Baker, single spindle
25" Superior Sliding Head, single spindle
4 ft. Dresses Radial, s.p.d.
3 ft. Prentice Radial, s.p.d.

GEAR CUTTERS
No. 5—60" Brown & Sharpe
No. 3—35" Brown & Sharpe
No. 6 Fellows Shaper, m.d.
No. 13 Brown & Sharpe
No. 12 Barber Colman Hobber
96" Gleason Spur & Bevel Gear Planer

GRINDERS
No. 72A3 Heald Gagematic
No. 75 Heald Internal
No. 60 Heald Cylinder
No. 3 Landis Universal
10x24 Norton Cylindrical
10x50 Norton Cylindrical
20"x144" Landis Cylindrical
30" Diamond Face
No. 14 Pratt & Whitney Surface
No. 2 Wilmarth & Morman Surface
No. 12 Brown & Sharpe Cutter

LATHES, ENGINE
14"x8' Lodge & Shipley, q.h.
14"x8' Reed-Prentice, q.h.
16"x8' Hendey, c.d. Tie bar
28"x16' Lodge & Shipley, c.d.
29"x14' Schumaker, Boye & Emmes, c.d.
8"x80" Fitchburg Lo-Swing, q.h.

LATHES, TURRET
No. 3A Warner & Swasey, q.h.
No. 2A Warner & Swasey, q.h.
26" Libby, q.h.
No. 5A Potter & Johnston
No. 4 Millholland, c.d.
No. 2 Brown & Sharpe
No. 0 Foster

MILLS
No. 2A Brown & Sharpe Universal, s.p.d.
No. 3 LeBlond Universal, c.d.
No. 3 Cincinnati Plain, s.p.d.
Model C Becker Vertical, s.p.d.
No. 5 Becker Vertical, c.d.
144" Betts Vertical Boring, m.d.
42" Bullard Vertical Boring, m.d.

MISCELLANEOUS
16" Betts Slotter
Wicaco Oil Groover
No. 3 Eclipse H. S. Furnace
No. 6 Whiting Stake Riveter
Betts Profiler, two spindle
8" Williams Pipe Threader
12" Williams Pipe Threader
No. 2 Garvin Tapper

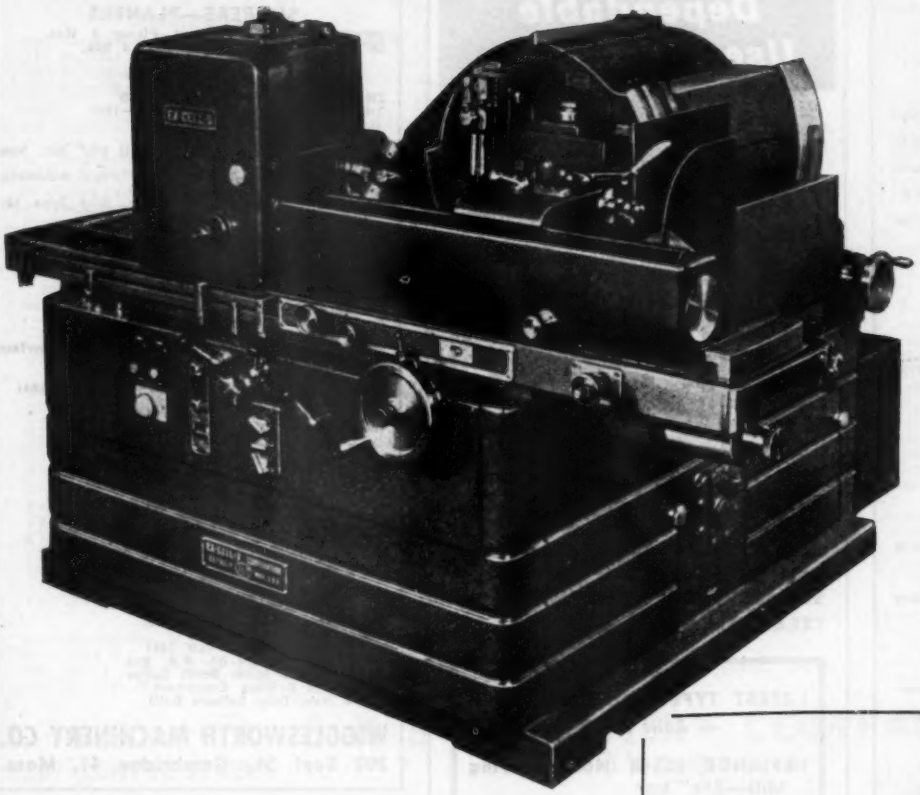
PLANERS & SHAPERS
96"x96"x25' Detrick & Harvey Openside Planer, 4 heads
32"x32"x10' New Haven Planer, 1 head
24"x24"x8' American Planer, 1 head
32" CINCINNATI Shaper, c.d.

Complete Facilities for REBUILDING and MOTORIZING Your Old Machine Tools

WRITE, WIRE or PHONE US

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.
1959-1969 South Meridian Street
INDIANAPOLIS 6, INDIANA
Eastern Branch:
44 WHITEHALL STREET, NEW YORK 4, N.Y.

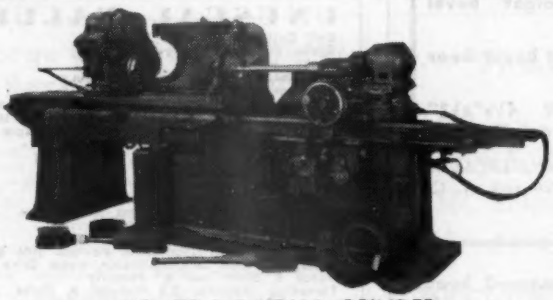
RECONVERT WITH THE LATEST!



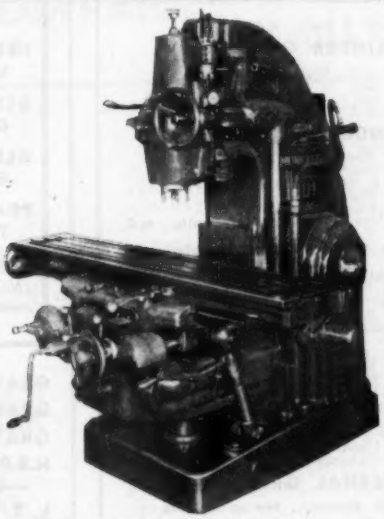
STYLE 35

EX-CELL-O PRECISION THREAD GRINDER

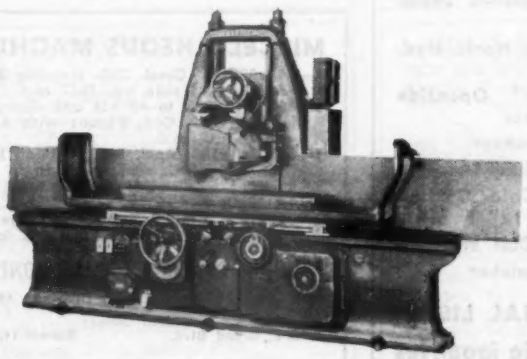
- USED LESS THAN 60 DAYS
- EQUAL TO NEW
- FULLY EQUIPPED



NO. 72-A-5 HEALD GRINDER



NO. 3H MILWAUKEE S.H.
VERTICAL MILLING MACHINE



12" x 16" x 60" MATTISON SURFACE GRINDER

Write for COMPLETE DETAILED DESCRIPTIONS and PRICES

George M. Bernstein & Co.

12 SO. CLINTON STREET CHICAGO 6, ILLINOIS

EASTERN OFFERS FROM STOCK

Immediate Shipment No Priority

MANUFACTURING MILLING MACHINES

No. 1-3 Kent-Owens Hydraulic, m.d. latest type (5)
No. 4-36 Cincinnati Plain Hydromatic, m.d., latest type
No. 34-36 Cincinnati Duplex Hydromatic, m.d., latest type (3)
No. 34-36 Cincinnati Duplex Hydromatic, m.d., with tracer control, latest type (3)
24" Cincinnati Automatic Duplex, m.d., National Standard Spindle
28" Cincinnati Plain Automatic, s.p.d.
4½x12" Pratt & Whitney Thread, m.d.
6x14" Pratt & Whitney Thread, belt
6x48" Pratt & Whitney Thread, m.d.
6x80" Pratt & Whitney Thread, m.d.
Carter & Hakes Mfg. belt
No. 2, 12 Pratt & Whitney Lincoln Type
Becker Lincoln Type, belt
36"x36"x14' Bement Slab, m.d., p.r.t.
54"x54"x10' Liberty Planer Type, var. speed m.d. p.r.t.
Burr Mfg. Type, m.d.

PLANERS

24"x24"x6' Pond, 1 head, belt
30"x30"x10' American, 1 head, belt
30"x30"x14' G. A. Gray, 2 heads, belt
36"x36"x12' Powell, 2 heads, m.d.
36"x36"x12' Gray, 2 rail, 1 side head, m.d.
36"x36"x10' Niles, 2 heads, belt
36"x36"x14' American, 2 heads, belt
36"x36"x16' Gray, 2 heads, m.d.
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Gray, 2 heads, belt
36"x36"x20'Cincinnati, 2 heads, belt
42"x42"x20' Cincinnati Hypro, 4 heads, reversing m.d.
42"x42"x26'Gray, 2 heads, m.d.
48"x48"x40' Sellers, 2 heads, reversing m.d.
50"x52"x32' Niles, 4 heads, m.d.
60"x60"x20' Cincinnati, 4 heads, m.d.; p.r.t.
60"x60"x20' G. A. Gray, 4 heads, m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d., p.r.t.
72"x72"x24' Niles-Bement-Pond, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, m.d.

CYLINDER GRINDERS

No. 50 Heald, m.d., hydraulic
No. 55 Heald, m.d.
No. 60 Heald, belt
No. 65 Heald, m.d.

CYLINDRICAL GRINDERS

6x18" Landis Plain, m.d.
6x32" Norton Plain, m.d.
10x48" Brown & Sharpe Plain, m.d.
10x52" Landis Plain, m.d.
10x72" Landis Plain, m.d.
10x96" Landis Type C Plain Hydraulic, m.d., latest type
10x120" Norton Type C Plain Hydraulic, m.d., latest type
12x36" Cincinnati, belt
12x36" Modern Plain, belt
12x36" Modern Plain, m.d.
12x42" Landis Plain, belt
12x48" Cincinnati Plain Self-Contained, 3 motor drive
12x48" Modern Plain, m.d.
12x72" No. 10 Brown & Sharpe Plain, belt
12x96" Landis Plain, m.d.
16x40" No. 3 Landis Unuiversal, motorized
14x18" Cincinnati Plain Self-Contained, 3 m.d.
16x68" Landis Plain, m.d.
20x120" Landis Plain, m.d.
26x96" Landis Plain, m.d.
16x68" Landis Universal, belt

INTERNAL GRINDERS

No. 72A3 Heald Sizematic, two motor drive
No. 6 Bryant, belt
No. 10 Bryant, belt
No. 20 Bryant, belt

SURFACE GRINDERS

38x38"x12' Gray Planer Type, m.d.
54" Bridgeport Knife, belt
14" Pratt & Whitney Vertical Surface, m.d., ball bearing spindle
No. 1 Fraser Lapper, 26" plate
Baldwin-Tuthill Knife Grinder, m.d.

TOOL & CUTTER GRINDERS

No. 1 Cincinnati, belt
Gisholt Universal Tool, belt
Gleason Cutter, belt
Gould & Eberhardt Gear Cutter, belt

1000 machines on our floor. Let us quote.
Telephone Melrose 1241

The EASTERN MACHINERY CO
1004 TENNESSEE AVE
CINCINNATI 29, OHIO

MOREY
Dependable Used Machines

LUCAS #1 Horiz. Boring Mill—3" bar, M.D.
BULLARD 24" Vert. Turret Lathe—with side head; R.P.
LANDIS 20"x220" Plain Cyl. Grinder—M.D.
G. & E. 18" Univ. Gear Hobber
GLEASON 3", 6" & 11" Bevel Gear Generators—2 tool type
GLEASON 10" Spiral Bevel Gear Generator
GLEASON 15" Spiral Bevel Gear Generator
K. & T. 3B Vert. Miller—Motor in Base
INGERSOLL 24" Cutter Grinder
INGERSOLL 26"x26"x12' Planer Type Miller
SAUNDERS 8-18" Pipe Threader
TREADWELL 12" Pipe Machine

LATEST TYPE MACHINE TOOLS — Built in 1942

DEFIANCE #25-A Horiz. Boring Mill—3¾" bar
GLEASON 12" Straight Bevel Gear Generator
GLEASON 3" Straight Bevel Gear Generators
PRATT & WHITNEY 4½"x12" Thread Miller—Model C

ALL MOTOR DRIVEN AND INCLUDING 3 phase, 60 cycle, 220 volt, A. C. motors

GRAY 36"x36"x10' Planer—2 heads
GRAY 44"x36"x10' Planer—3 heads
GRAY 60"x48"x14" Planer—3 heads
N.B.P. 48"x36"x14' Planer—3 heads—box table
L. T. SCHAEFER 100 ton Horiz. Hyd. Forcing Press
LYND FARQUHAR 26" Openside Crank Planer & Shaper
GISHOLT Precision Balancer
BAUSH Gun Barrel Rifling Machine
ESPEN LUCAS #138 Cold Cutting Saw—Cap. of blade 12"
SLEEPER & HARTLEY Coil Winder
CINCINNATI Gear Burnisher

THIS IS A PARTIAL LIST
Send us your specific inquiries

MOREY MACHINERY CO., Inc.
410 BROOME ST., NEW YORK

GEAR MACHINERY

9" Pratt & Whitney Gear Grinder, M.D. 1937
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper, M. D.
Cimatool Gear Chamfering Mach., M.D.
Lees-Bradner Gear Grinder

SHAPERS—PLANERS

20"x26"x8' Woodward-Powell Planer 2 Hds.
36"x48"x12' Cins. Hypro. Planer, 4 hds.

MILLERS

2H Kearney & Trecker Plain—1940
2H Kearney & Trecker Vert. (2)—1941
U.S. Hand Millers (10) 1941
U.S. Multi-Millers (4) 1941
No. 25-B Defiance Hor. Bor. Mill 3¼" bar, New 1941
No. 1—12" and 1—18" Cincinnati Plain Automatic millers latest type (8) 1941
No. 2 Cincinnati Vertical Miller, Dial Type (4) 1941
No. 3 Cins. Dial Type Hor. 1941
New No. 2 Wigglesworth
4" Taylor & Fenn Duplex Spline 1941

GRINDERS

No. 72-A—3—Heald Plain
No. 72-A—3—Heald Sizematic
16"x216" Landis Pl. Grinder—latest type 1941
No. 35 Gallmeyer & Livingston Hydraulic Surface grinders, latest type (6)
10"x72" Model C Norton 1941
10"x120" Norton Type C Grinder—latest type 1941
12"x120" Landis Pl. M.D.
No. 10 B & S Plain Grinder, M.D.
No. 3 Osterlein C & T Grinder

LATHES—TURRET LATHES

22"x72" Lodge & Shipley 1941
24"x72" LeBlond Lathe 1941
16"x78" Monarch Lathe (2) 1941
12"x30" Monarch Lathe 1940
No. 1A Warner & Swasey (2) 1941
6"x8¾" Goss & DeLeeuw Chucking Machine
No. 6R Cincinnati Acme 1941
24" Bullard Vert. Turret, Hi-Speed 1940

MISCELLANEOUS

1½" Consornatic 4 spindle 1940.
Gorton Engravers (4) 1941
No. O-Ajax Forming Roll 1941
No. 21-SA Cochrane-Bly H.S. Saw
No. 171 Bliss Stiles Sprue Cutter
New Delta Drilling Equipment
No. 4 Hvy. Duty Colburn Drill

WIGGLESWORTH MACHINERY CO.
203 Bent St., Cambridge 41, Mass.

UNUSUAL VALUES

Belt Cutter .1" capacity 3 spindle
Brake Robinson 5' toggle
Brake, Chicago steel, 3'
Compressor, 120 Schramm, portable
Drill, new 16" Buffalo bench
Drill, ceiling suspended, unlimited drilling area
1—20" Spindle Head b.g. power feed #4 M.T.
Drill, two-spindle sensitive, #1 Morse taper
Drill, Bickford 42" radial
Grinder, #20 Bryant deep hole internal
Grinder, Sellers Tool
Grinder, 60" knife
Hammer, 20# Bradley upright, helve
Lathe, J & L 2 x 24 turret motor drive
Pipe Machine, 8" Oster motor drive
Planer, American 30" x 30" x 8' MD.
Press, #8-7 Zah-Hahnemann straight side grd.
Press, #1 open back inclinable, motor drive
Punch & Shear two ½" capacity
Threading Machine, #0 Webster & Parks
Vacuum Cleaners, heavy duty for shop use

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

MISCELLANEOUS MACHINES

1—36"x36"x12' Cinci. Dbl. Housing Planer 2 rail hds., 1 side hd., D.C. m.d.
1—36" widened to 48"x36"x16' Gray Dbl. Housing Spur Grd. Planer with 3 hds., 3-speed A.C. m.d.
1—54"x54"x18" Cinci. Dbl. Housing Planer with 3 hds. D.C. vari. speed m.d.
1—8' Niles Pl. Radial Drill, rebuilt, gear box, A.C. m.d.
1—12"x18" Cinci. Rebuilt Plunge Cut Grinder, 18"x9" face wheel, A.C. m.d.

STRONG, CARLISLE & HAMMOND CO.
1392 West 3rd St. Cleveland 13, Ohio
Branch Offices:
2832 E. Grand Blvd. Detroit 11, Mich.

1—used Watson Stillman 400 ton single opening hydraulic press, 16" dia., by 21" stroke downward acting ram, 48" daylight opening, 31" bottom bolster, 24" x 24" platen, clear space left to right between uprights 30¾". HIGHEST PRICES PAID FOR YOUR SURPLUS EQUIPMENT.

Universal Hydraulic Machinery Company
286 HUDSON STREET NEW YORK 13, N. Y.
WAlker 5-5332-3

FOR IMMEDIATE DELIVERY—

JUST PURCHASED MANY TURRET LATHES, MILLERS AND GRINDERS

BORING MILLS

54" Cincinnati Hypro, Vert. Used 3 months
24" Bullard Vert.
4" Bickford, S.P.D. Horiz.
3" Betts Horiz.

RADIAL DRILLS

3A Carlton 5'-17" Col. New 1941. Slightly used.
6' Cincinnati Bickford
5' Fosdick M.D.
4' Cannedy-Otto
4' Cincinnati-Bickford M.D.
4' Dreses
3½' Niles M.D.
#25 Foot Burto, H.D. S.P.
24" Cincinnati Sliding Head, Tapping Attach. Drill Press
Leland & Gifford 4 Spindle, Power Feed to spindles, M.D.

MILLING MACHINES

#5 Cincinnati Hi Power, Rapid Power Traverse, M.D.
#3 Cincinnati S.P. M.D.
#3 Hendey, S.P. M.D.
#2 & #3 Kempsmith, M.D.
#2 Brown & Sharpe, M.D.
#1 & #2 Cincinnati Univ. M.D.
#2 Van Norman, M.D.
#OY Brown & Sharpe
#O Brown & Sharpe
#25 Bilton, M.D.
#13 Garvin
#7H Becker Production
#2 & #3 Cincinnati and Brown & Sharpe Vertical, M.D.
#3C Becker Vertical, M.D.

SHAPERS

32" Stockbridge M.D.
24" Ohio S.P. M.D.
20" Gould & Eberhardt S.P. M.D.
18" Juengst M.D.
18" Springfield M.D.
18" Flather M.D.
18" Hendey M.D.
17" Smith & Mills S.P. M.D.
16" Potter & Johnston, M.D.

TURRET LATHES

#2A Warner & Swasey, M.D. with tools
#2, #4, #6 Warner & Swasey, M.D. with tools
#1B Foster Universal

LATHES

86"x15' Centers Putnam
65"x20' American 8 speed G.H. M.D.
48"x72"x20' Harrington, G.H. Sliding bed gap
36"x18' Putnam Double Back Geared, Int. Geared Fave Plate Driven, M.D.
27"x10' American Super Prod. Pump & Fittings, pan bed. 1941 machine
25"x18' Leblond, G.H. M.D. pan bed, taper attach.
24"x14' Boye & Emmes
24"x12' Advance, Q.C. M.D.
24"x12' Putnam
24"x12' Leblond, M.D. Pan Bed. 1941 machine
22"x12' Leblond, M.D. Pump & Fittings, Pan Bed. 1941 machine
20"x10' LeBlond Production, 1941 machine.
20"x12' Fay & Scott, M.D. Q.C. 1941 machine
18"x36" Rahn & Larmon Gap, Q.C. M.D.
18"x8' Hendey, M.D. Taper Attachment.
18"x8' Leblond, Heavy, M.D.
16"x8' Lodge & Shipley, 1941 machine
16"x8' Lodge & Shipley, M.D.
16"x8' Pratt & Whitney Tool Room, Taper, M.D.
16"x6' South Bend
16"x6' Reed Prentice, G.H. M.D.
16"x6' Wooster G.H. Q.C. M.D.
14"x5' Pratt & Whitney Tool Room, Taper, M.D.
14"x6' South Bend
12"x4' Clausing
12"x3' Sunstrand G.H. Taper
10"x36" Logans

GRINDERS

#3 Brown & Sharpe Cylindrical
10"x48" Norton
6"x10"x36" Norton Surface, Type G. 40x9 Magnetic Chuck
#70 Internal
#1-G Abrasive Internal, M.D.
#5 Covell Surface
12" Pratt & Whitney Vertical Surface
Sterling Tool & Cutter
Bridgeport Knife Grinder
Stanley Double End Bench Grinders

MISCELLANEOUS

8' Robinson Power Press Brake, 16 gauge
8' Foote Brake
6' Foote Shear
Honing Presses
Various sizes Power Presses
4 Rafter Machine Co. 3, 5, 7 & 8 Head Metal Moulding Rollers, M.D. with Angle Drives, Feeding & Straightening Rolls, complete with motors, starters and all extra equipment. Can be operated as one set.
2 Sets Rollers, 3½" Spindles, 7" between housing. Can be operated as one set.
800# Chambersburg Steam or Air Hammer
Smalley 6" Thread Miller
#4 Nielson 4 Slide Machine
#3 Manville 4 Slide Machine
Manville Header
#2 Waterbury-Farrel Header
9"x11" Robertson Hacksaw, M.D.
12'x3/8 Loy & Nawrath Power Press Brake
50 Ton Screw Press
175 Ton Hydraulic Press, complete with pump
6x14 Pratt & Whitney Thread Miller
Gould & Eberhardt Gear Cutter

S & S MACHINERY COMPANY

207 CENTRE STREET — **Telephone: WOrth 4-5710** — **NEW YORK 13, N. Y.**

Large Gould & Eberhardt Rack Cutter For Sale
A Rare Tool

Length of bed 13', Length of Table 8'. Direct motor driven, Cap. 2½" Pitch—5½" OD. Has 7 Rack Backings 7' Long. 4 Index Plates, 23 Feed Gears 20-120T, 8 Index Gears 20-48T. 49 Table Index Gears 21-75T, 153 Assorted High Speed Cutters. Machine guaranteed in excellent condition

For further details wire, phone or write

JOSEPH BEAL & CO.
465 Atlantic Ave. Boston, Mass.
Hancock 6460-6461

PRACTICALLY NEW

Pratt & Whitney No. 12B
DBL SPINDLE PROFILER &
30" SINGLE SPINDLE

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

OTT MACHINERY SPECIALS

AUTOMATICS, Acme, Model C—9/16" M.D.
AUTOMATICS, Gridley, 9/16, ⅝ & 1¼" Mod. G.
AUTOMATICS, Cone, 1¼ & 1½" 4 spindle
AUTOMATICS, Gridley, ¾, 1¼, 1¾ & 2¾" Model F
AUTOMATICS, Gridley, 2¼, 3¼, & 4¼" S. S.
AUTOMATICS, Cleveland, 1¼, 1½, 2¾ & 3¾"
AUTOMATICS, Cleveland, ⅞, 1¾, & 2" Mod. B
AUTOMATICS, Cleveland ⅞, 1¾ & 1½" Mod. M
AUTOMATICS, New Britain #22 & 24 M.D.
AUTOMATICS, Potter & Johnston #5a & 6A
BORING MILLS, 24" Bullard M.D.
BORING MILLS, Rockford, 3¼" bar
BORING MILLS, Horizontal, 24x72" table
DRILLS, High Sped, B. B. 1 to 6 spindles
DRILLS, Foote-Burt Heavy Duty, #5 M.T.
GEAR HOBBERS, 12 Barber-Colman, M.D.
GEAR SHAPERS, #7 High Speed, M.D.
GRINDER, Brown & Sharpe #2 Universal M.D.
GRINDERS, Cincinnati 12" x 18" Plunge Cut
GRINDERS, Diamond Surface #2, M.D.
GRINDERS, Pratt & Whitney, 14" Vertical Surface, M.D.
GRINDERS, P-Arter 12" Rotary surface, M.D.
GRINDERS, Van Norman Internal #34 M.D.
LATHES, Hendey, G.H. 12"x5' and 6', M.D.
LATHES, Monarch 14"x8' & 20" x 8' M.D.
LATHES, J. & L. 3"x36" Dble Spindle
LATHES, Warner & Swasey #2, 4, & 6, M.D.
LATHES, Warner & Swasey, #5 Geared Head, M.D.
MILLING MACHINES, Becker Vertical Model S. D. 40" Rotary Table
MILLING MACHINES, Becker Vertical #5 & 6
MILLS, Briggs Production Type A&B
PLANER, Ohio 42" x 42" x 12' One Head, M.D.
PLANER, Gray 30" x 30" x 8', 2 Rail Heads

OTT MACHINERY SALES, INC.
542 Second Avenue
Detroit 26, Mich.

---

100 KW FEDERAL BUTT WELDER
2—No. 36 TOLEDO PUNCH PRESSES, B.G., STILES.
1½" and 2" Mod. B. CLEVELAND AUTO. Screw Mach. serial numbers over 33,000, air chucks.
SUNDSTRAND, 8 spindle, special Horizontal Drilling and Milling machine, motor driven.
● We carry a complete line of standard toolroom equipment. Send us your inquiries.

GILMORE MACHINERY CO.
28 So. Clinton St. CHICAGO 6, ILL.

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MONA

B. D. BROOKS, INC.
301 Atlantic Ave., Boston, Mass.

MACHINE TOOLS

Excellent condition!

No. 4 Portage Horizontal Boring, Drilling & Milling Machine
5' American Plain Radial Drill
Thompson Universal Grinder, 12" x 30"
3⅞" Niles Bement Pond horizontal Boring Bar

ALL MOTOR DRIVEN

(Write for complete detailed specifications!)

Iron & Steel Products, Inc.
13498 S. Brainard Ave., Chicago, Ill.
"Anything containing IRON or STEEL"

AUTOMATIC SCREW MACHINES, OOG, OG and No. 2 B. & S. High Speed.
BORING MILLS, 2½" bar Giddings & Lewis, SPD. 4½" bar Defiance, m.d. (8 years old).
MILLING MACHINES, No. 2B, K & T, Univ. SPD. No. 4 Cincinnati, plain, SPD.
MULTIPLE GANG PUNCH, 500 ton Cleveland, 10' bed, 2" stroke.
RADIAL DRILL, 4' American, SPD.
SCREW PRESS, 100 ton MINSTER

MONA

SEGAL MACHINERY CO.
123 So. Clinton St., Chicago 6, Ill.

The Habit OF PRECISION

● Long before the war, Allied Products Corporation formed the habit of precision—in building sheet metal dies, intricate jigs and fixtures, R-B interchangeable punches and dies and other vital production tools for the automotive industry.

Meeting the demands of war production, Allied created new facilities where *the habit of precision* would do the most good. Thus, for the past several years, a great variety of large and small, hardened and precision ground parts have flowed from Allied plants into airplane engines, guns and other implements of war. Some of these parts are finished to within limits of two ten-thousandths of an inch and are being produced in great volume.

When peace comes, a large part of this "pool of precision"—skilled craftsmen, mass production equipment and practical experience — will be available to manufacturers of consumer goods. If you are looking for a dependable source of supply, let's get together now. At Allied, precision and economy have advanced hand in hand.

• • •

"IT'S AN ALLIED PRODUCT!" . . . Allied Products Corporation and its divisions, Richard Brothers and Victor-Peninsular, in Detroit and Hillsdale, Michigan, also make: Steam-heated plastic molds; cap screws; cold forged parts; and other special products.

All Four Plants Have Added Stars To Their Army-Navy "E" Pennants

BUY MORE WAR BONDS

ALLIED PRODUCTS CORPORATION

Executive Offices:
4646 Lawton Avenue
Detroit 8, Michigan

ADVERTISERS INDEX

	Page
Abbott Ball Co.	196
Abrasive Machine Tool Co.	250
Acheson Colloids Corp.	Opposite 320
Acme Aluminum Alloys, Inc.	164
Acme Machine Tool Co.	38
Acromark Co.	326
Adams Company	205
Aerco Corp.	311
Ajax Mfg. Co.	221
Allen Mfg. Co.	200
Allied Products Corp.	346
Allis-Chalmers Mfg. Co.	60
Almond Mfg. Co., T. R.	330
Aluminum Co. of America	43
American Broach & Machine Co.	39
American Chain & Cable Co., Inc.	240, 335
American Cutter & Engineering Corp.	300
American Gas Furnace Co.	325
American Laundry Machinery Co.	242
American Magnesium Corp.	51
American Metal Hose, Branch American Brass Co.	266
American Optical Co.	199
American Screw Co.	177
American Swiss File & Tool Co.	268
American Tool Works Co.	20, 21
Ampco Metal, Inc.	190
Ampco Twist Drill Co.	132
Angier Corp.	308
Apex Machine & Tool Co.	282
Armstrong-Blum Mfg. Co.	333
Armstrong Bros. Tool Co.	331
Arter Grinding Machine Co.	246
Atlantic Screw Works	163
Automotive Maintenance Machinery Co.	224
Avey Drilling Machine Co.	228
Axelson Mfg. Co.	231
Bakelite Corp.	169
Baker Bros., Inc.	226
Baldwin Southwark Div., Baldwin Locomotive Works	143
Ball & Roller Bearing Co.	322
Bantam Bearings Division, The Torrington Co.	180
Barber-Colman Co.	45
Bardons & Oliver	59
Barnes Drill Co.	241
Barrett Co., Leon J.	332
Baumbach Mfg. Co., E. A.	214
Baush Machine Tool Co.	227
Behr-Manning Corp.	274
Bellows Co.	247
Best Tools Corp.	292
Bethlehem Steel Co.	276
Bilgram Gear & Machine Works	206
Black & Decker Mfg. Co.	175
Blake Co., Edward	334
Blanchard Machine Co.	46
Blank & Buxton Machinery	176
Bokum Tool Co.	300
Boots Aircraft Nut Corp.	190
Boyar-Schultz Corp.	250
Bradford Machine Tool Co.	240
Braun Gear Co.	204
Bridgeport Machines, Inc.	258
Bristol Co.	163
Brown & Sharpe Mfg. Co.	35
Brown Instrument Co., Div. Minneapolis Honeywell Regulator Co.	197
Bryant Chucking Grinder Co.	68
Buffalo Bolt Co.	181
Buffalo Forge Co.	260
Bullard Co., The	42
Bunting Brass & Bronze Co.	185
Burke Machine Tool Co.	240
Cadillac Gage Co.	72
Campbell, Andrew Co., Div. American Chain & Cable Co., Inc.	240
Carboloy Co., Inc.	145
Carborundum Co.	291
Card Mfg. Co., S. W. Div. Union Twist Drill Co.	296
Carlton Machine Tool Co.	250
Central Screw Co.	163
Century Electric Co.	167
Chandler Products Corp.	163
Chase Brass & Copper Co.	171
Chicago Screw Co.	192
Chicago Tool & Engrg. Co.	334
Chicago Wheel & Mfg. Co.	154
Cincinnati Bickford Tool Co.	87
Cincinnati Electrical Co.	330
Cincinnati Gear Co.	204
Cincinnati Grinders, Incorporated	10, 11
Cincinnati Lathe & Tool Co.	248
Cincinnati Milling Machine Co.	4, 5
Cincinnati Planer Co.	34
Cities Service Oil Company	168
Cleveland Crane & Engineering Co.	220
Cleveland Hobbing Machine Co.	137
Cleveland Pneumatic Tool Co.	217
Cleveland Twist Drill Co.	283
Cleveland Twist Drill Co., Momax Div.	271
Columbia Steel Co.	174
Cone Automatic Machine Co., Inc.	17
Consolidated Machine Tool Corp.	30
Continental Screw Co.	163
Corbin Screw Corp.	163
Coulter Machine Co., James	244
Crafts Co., Inc., Arthur A.	306
Criterion Machine Works	300
Danly Machine Specialties, Inc.	212
Darwin & Milner, Inc.	330
Davis Keyseater Co.	250
Davis & Thompson	258, 320
Dayton Rogers Mfg. Co.	214
Dearborn Gage Co.	156
Desmond-Stephan Mfg. Co.	332
Detroit Bevel Gear Co.	202
Detroit Tap & Tool Co.	141
DeVlieg Machine Co.	49
Diamond Tool Co.	324
Do-All Co.	301
Dodge Mfg. Corp.	184
Dumore Co.	305
Dykem Co.	326
Eastern Machine Screw Corp.	320
Eddy Manufacturing Co.	310
Elastic Stop Nut Corp.	165
Electric Furnace Co.	323
Electric Auto-Lite Co.	161
Elmes Engrg. Works of American Steel Foundries	215
Errington Mechanical Laboratory	330
Etna Machine Co.	222
Ettco Tool Co.	264
Fairfield Mfg. Co.	202
Fawick Airflex Company, Inc.	275
Federal Bearings Co., Inc.	85
Fellows Gear Shaper Co.	8, 9
Fidelity Machine Co.	242
Firth-Sterling Steel Co.	64, 65
Fitchburg Grinding Machine Corp.	41
Fitzsimmons Co.	176
Foote Bros. Gear & Machine Co.	207
Forsberg Manufacturing Co.	290
Fosdick Machine Tool Co.	50
Fostoria Pressed Steel Corp.	208
Gallmeyer & Livingston Co.	244
Ganschow Gear Co.	204
Gardner Machine Co.	232
Gear Specialties Mfrs.	206
General Die-Stamping-Tool Co.	314
General Electric Co.	47, 67
General Machinery Corp. (Ohio)	27
General Screw Mfg. Co.	163
Geometric Tool Co.	332
Gisholt Machine Co.	76
Gleason Works	3
Gorham Tool Co.	284
Gorton Machine Co., George	261
Goss & deLeeuw Machine Co.	252
Grant Gear Works	202
Grant Mfg. & Machine Co.	214
Gray Co., G. A.	48
Gray-Mills Co.	200
Great Lakes Broach & Gage Co.	139
Grobet File Co.	288
Gulf Oil Corp.	265
H & H Machine Tool Co.	314
Hamilton Tool Co.	244
Hanchett Mfg. Co.	236, 245
Hardinge Brothers, Inc.	29
Harper Co., H. M.	163
Hartford Special Machinery Co.	206, 316
Haskins Co., R. G.	162
Heald Machine Co.	2nd Cover
Hill Acme Co.	82
Hobart Brothers Co.	332
Hoefer Mfg. Co.	262
Holliday & Company, W. J.	213
Holman Reamer Co.	320
Hones, Inc., Charles A.	246
Hydraulic Press Mfg. Co.	218, 219
Ingersoll Milling Machine Co.	40
Ingersoll Steel & Disc Div. Borg Warner Corp.	269
International Detrola Corp., Foster Div.	253
International Nickel Co.	178
International Screw Co.	163
J & S Tool Co.	316
James Mfg. Co., D. O.	208
Jessop & Sons, Inc., Wm.	186
Johnson Machine Co., Carlyle	193
Jones & Lamson Machine Co.	6, 7
Junkin Safety Appliance Co.	334
Kalamazoo Tank & Silo Co.	256
Kaufman Mfg. Co., L. J.	246
Kearney & Trecker Products Corp.	52
Kempsmith Machine Co.	83
Kennametal, Inc.	37
Kent-Owens Machine Co.	234
Kingsbury Machine Tool Corp.	33
Knight Machinery Co., W. B.	238
Knu-Vise, Inc.	296
Kux Machine Co.	192
Laminated Shim Co., Inc.	152
Lamson & Sessions Co.	163
Landis Machine Co.	14, 15
Landis Tool Co.	18, 19
LaPointe Machine Tool Co.	267
Leach Machinery Co., H.	242, 262
LeBlond Machine Tool Co., R. K.	63
Lee Co., K. O.	254
Lees-Bradner Co.	69
Lehmann Machine Co.	237
Leland Gifford Co.	258
LeMaire Tool & Mfg. Co.	316
Lempco Products Co.	75
Liberty Planers, Inc.	239
Lincoln Electric Co.	80, 81
Linley Bros. Co.	262
Lipe-Rollway Corp.	249
Lodge & Shipley Machine Tool Co.	135
Logan Engineering Co.	223
Lombard Governor Corp.	302
Lord Manufacturing Co.	179
Lucas Machine Tool Co.	248
Ludlow Saylor Wire Co.	324
Luers, J. Milton	332
Lynn Mfg. Co.	332
Machinery Manufacturing Co.	312
Madison Manufacturing Co.	322

ADVERTISERS INDEX

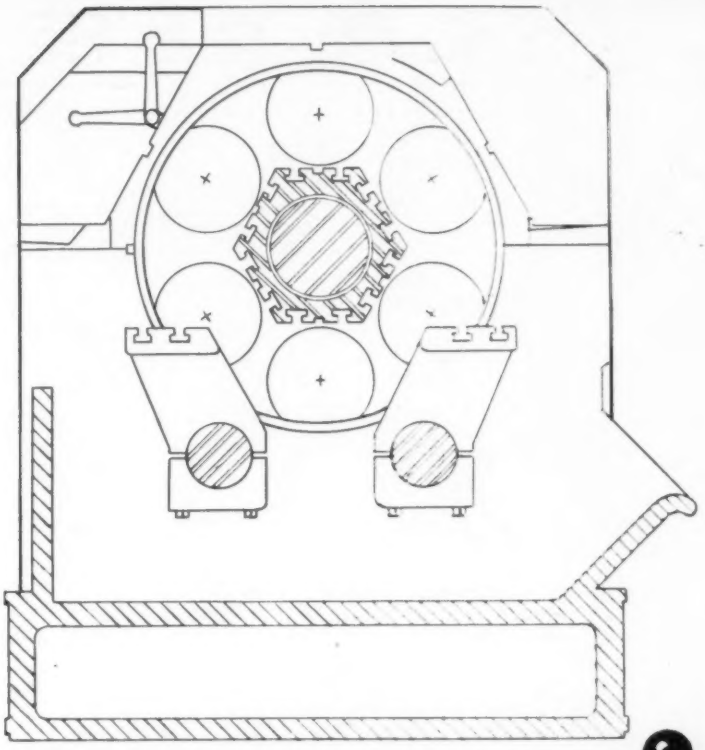
	Page
Mahon Co., R. C.	263
Mallory & Co., Inc., P. R.	278
Manufacturers Screw Products	163
Master Gauge Co.	310
Mattison Machine Works	32
McCaskey Register Co.	166
McGrath-St. Paul Co.	320
McGraw-Hill Book Co., Inc.	198, 256, 260
Meisel Press Mfg. Co.	206
Mercury Products Co.	314
Metal Carbides Corp.	320
Metro Tool & Gage Co.	26
Meyers Co., Inc., W. F.	233
Micromatic Hone Corp.	70, 71
Mid-West Abrasive Co.	78
Midwest Tool & Mfg. Co.	280
Milford Rivet & Machine Co.	163
Miller-Knuth Manufacturing Co.	250
Milholland Machinery Co., W. K.	248
Mitts & Merrill	248
Monarch Machine Tool Co.	24, 25
Monarch Steel Co.	176
Morey Machinery Co., Inc.	248
Morris Machine Tool Co.	90
Morse Chain Co.	189
Morse Twist Drill & Machine Co.	329
Motch & Merryweather Co.	16
National Acme Co.	277
National Broach & Machine Co.	225
National Lock Washer Co.	191
National Machine Tool Co.	308
National Screw & Mfg. Co.	163
National Tool Co.	297
National Tube Co.	174
National Twist Drill & Tool Co.	317
Newark Gear Cutting Machine Co.	204
New Britain-Gridley Machine Div. New Britain Machine Co.	3rd Cover
New England Screw Co.	163
Nichols & Sons, W. H.	160
Nicholson & Co., W. H.	306
Noble & Westbrook Mfg. Co.	324
Norgren Co., C. A.	198
North Brothers Mfg. Co.	158
Norton Co.	22, 23, 74
Numberall Stamp & Tool Co.	314
O.K. Tool Company	326
Oakite Products, Inc.	279
Ohio Gear Co.	201
Oliver Instrument Co.	254
O'Neil Irwin Mfg. Co.	214
Optimus Equipment Co.	310
Oster Mfg. Co.	259
Palmer-Shile Co.	194
Parker-Kalon Corp.	163, 188
Pawtucket Mfg. Co.	186
Pawtucket Screw Co.	163
Peninsular Grinding Wheel Co.	272, 273
Pheoll Manufacturing Co.	163
Phillips Screw Manufacturers	163
Pope Machinery Corp.	287
Portage Machine Co.	252
Potter & Johnston Machine Co.	61
Pratt & Whitney Div. Niles-Bement-Pond	31
Production Machine Co.	252
Producto Machine Co.	212
Quaker City Gear Works, Inc.	204
Quality Tool & Die Co.	281
Randall & Stickney	312
Reading Screw Co.	163
Ready Tool Co.	322
Remington Rand, Inc., Systems Div.	44
Republic Gage Co.	306
Revere Copper & Brass, Inc.	149
Rhoads & Sons, J. E.	194
Rieger Mfg. Co.	306
Robbins & Myers, Inc.	182
Rockford Machine Tool Co.	254
Russell Burdsall & Ward Bolt & Nut Co.	163
Ruthman Machinery Co.	194
Ryerson & Son, Inc., Jos. T.	150
Sav-Way Industries	229
Scherr Co., George	66
Scovill Manufacturing Co.	163
Sellers & Co., Wm.	235
Seneca Falls Machine Co.	230
Severance Tool Industries, Inc.	299
Shakeproof, Inc.	163
Sheffield Corp.	Opposite 321
Sheldon Machine Co., Inc.	254
Shore Instrument & Mfg. Co., Inc.	322
Sier-Bath Gear Co., Inc.	203
Siewek Tool Div. Domestic Industries, Inc.	307
Simonds Saw & Steel Co.	313
Simonds Worden White Co.	298
Sinclair Refining Co. (Inc.)	62
Sisalkraft Co.	294
Skilsaw, Inc.	153
Smit & Sons, J. K.	172
Smith & Mills Co.	258
South Bend Lathe Works	84
Southington Hardware Mfg. Co.	163
Springfield Machine Tool Co.	258
Stahl Gear & Machine Co.	206
Standard Conveyor Co.	151
Standard Oil Co. (Indiana)	303, 304
Standard Pressed Steel Co.	183
Steelweld Machy. Div. of Cleveland Crane & Engrg. Co.	220
Sterling Grinding Wheel Division	77
Sticht Co., Inc., Hermon H.	312
Stokerunit Corp.	257
Stow Mfg. Co.	308
Strand Co., N. A.	312
Strong, Carlisle & Hammond	196
Stuart Oil Co., Ltd., D. A.	294
Sun Oil Co.	86
Super Tool Co.	327
Surface Combustion Corp.	289
Texas Co.	155, 318, 319
Thomas Hoist Co.	264
Thomas Steel Co.	172
Threadwell Tap & Die Co.	295
Thriftmaster Products, Div. Zimmer Thompson Corp.	243
Timken Roller Bearing Co. (Steel & Tube Div.)	79, 4th Cover
Tool Improvements Co.	298
Torrington Co.	147, 214
Torrington Co., Bantam Bearings Division	180
Trabon Engineering Corp.	195
Triplett & Barton, Inc.	321
Tubular Micrometer Co.	314
Turner Gauge Grinding Co.	157
Tuthill Pump Co.	192
Union Carbide & Carbon Corp.	169
Union Twist Drill Co.	58
U. S. Drill Head Co.	310
U. S. Steel Corp.	174
U. S. Steel Export Co.	174
Universal Boring Machine Co.	254
Universal Engineering Co. (Michigan)	292, 298
Universal Engineering Co. (California)	326
V & O Press Co.	214
Van Keuren Co.	73
Van Norman Co.	12, 13
Vascaloy Ramet Corp.	250
Veeder-Root, Inc.	170
Vickers, Inc.	159
Victor Machinery Exchange, Inc.	288
Vinco Corporation	36
Vitrified Wheel Co.	302
Wade Tool Co.	255
Walker Co., Inc., O. S.	328
Waltham Machine Works	212
Waltham Screw Co.	328
Warner & Swasey Co.	88
Watson-Stillman Co.	209
Webber Gage Co.	130
Weldon Tool Co.	290
Western Felt Co.	292
Westinghouse Electric & Mfg. Co.	57
Westinghouse Precipitation	28
Wheel Trueing Tool Co.	270
Wheelock Lovejoy & Co., Inc.	196
Wickman Corp.	251
Wilson, K. R.	210, 211
Wilson Mechanical Inst. Co., Inc.	214
Wirth & Son, Carl	309
Wolverine Bolt Co.	163
Woodworth Co., N. A.	293
Worcester Pressed Steel Co.	216
Worthington Pump & Machinery Corp.	187
Wright Mfg. Div. American Chain & Cable Co., Inc.	315
Wyckoff Steel Co.	173
Wyzenbeek & Staff, Inc.	328
Zeh & Hahnemann Co.	212

Classified Advertising

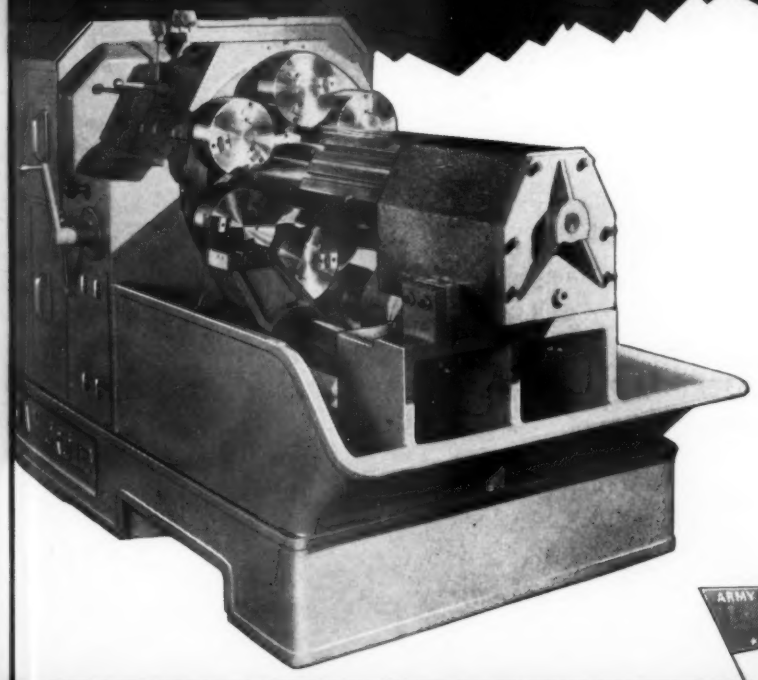
SEARCHLIGHT SECTION

Classification	*page*
BOOKS	338
BUSINESS OPPORTUNITIES	338
CONTRACT WORK SECTION	335
Bergen Machine & Tool Co., Inc.	335
Bison Forge Co.	335
Eastern Tool & Mfg. Co.	335
Fasoldt & Son, Dudley	335
Freeport Machine Works, Inc.	335
General Pattern Works	335
Gilbert-Baker-Midlam Co., The	335
Greist Mfg. Co.	335
J. & S. Tool Co.	335
Nilson Machine Co., A. H.	335
Thomas & Skinner Steel Products Co.	335
EMPLOYMENT SERVICE	338
PATENT ATTORNEY	338
POSITIONS VACANT	336
POSITIONS WANTED	286
REBUILDING SERVICE	335, 339, 342
Hill-Clarke Machy. Co.	339
Simmons Machine Tool Corp.	342
Volyn Machine Tool Works Inc.	335
SELLING OPPORTUNITIES	338
WANTED TO PURCHASE	338
USED EQUIPMENT	338-345
Aaron Machinery Co.	342, 345
Ames Iron Works	338
Beal & Co., Joseph	345
Bernstein & Co., Geo. M.	343
Brooks, B. D.	345
Cincinnati Machinery & Supply Co.	339
DeWitt Tool Co.	340
Dony Machinery Co., D. E.	340
Eastern Machinery Co.	344
Eisemann Corp.	340
Falk Machinery Co.	337
Gilmore Machinery Co.	345
General Machinery & Equip Co.	338
Harrison Co., Chas. G.	340
Hill-Clarke Machinery Co.	339
Hyman & Son, Joseph	339
Indianapolis Machinery & Supply Co.	342
Interstate Machinery Co., Inc.	338, 341
Iron & Steel Products Inc.	340, 345
McDonald Machinery Co.	340
Miles Machinery Co.	339
Morey Machinery Co., Inc.	344
Ohio Electric Mfg. Co.	340
Osborne & Sexton Machinery Co.	344
Ott Machinery Sales, Inc.	345
Paul's Motor & Machy. Supply	339, 340
Salter, Jay	338
S. & S. Machinery Co.	345
Siegman Machinery Co.	340
Simmons Machine Tool Corp.	342
Straits Tool & Machine Co.	338
Strong, Carlisle & Hammond Co.	344
Universal Hydraulic Machy. Co.	344
West Penn Machinery Co.	340
Wigglesworth Machinery Co.	344
Zeeve & Co., Alex	339
Segal Machinery Co.	345

DESIGNED FOR QUICK AND EASY TOOLING



. . . Because changing from one job to another without long labor and time consuming periods is a feature of NEW BRITAINS, many a manufacturer has been able to take advantage of the basic superiority of multi-spindle machines.

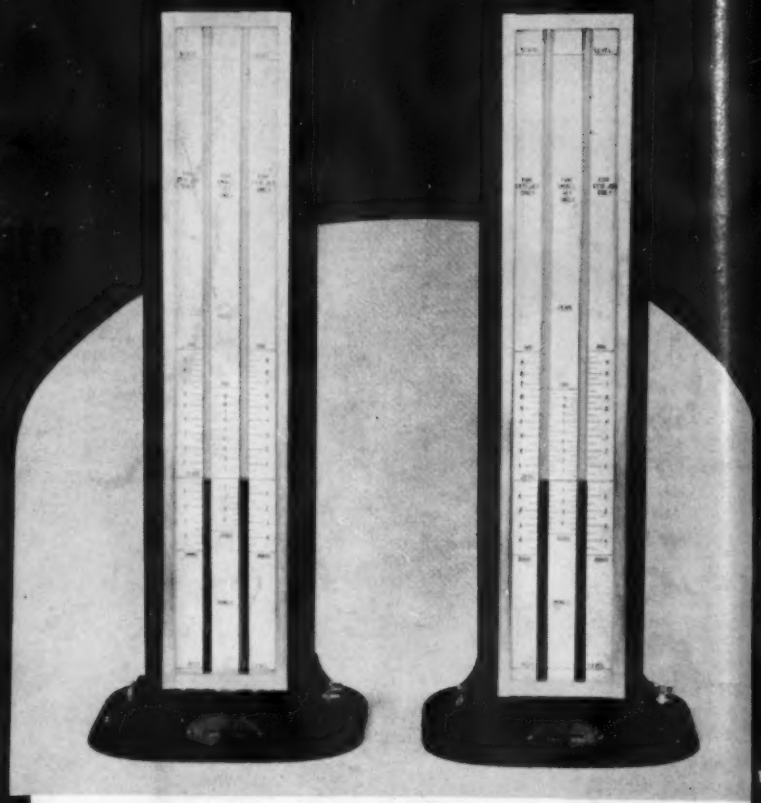


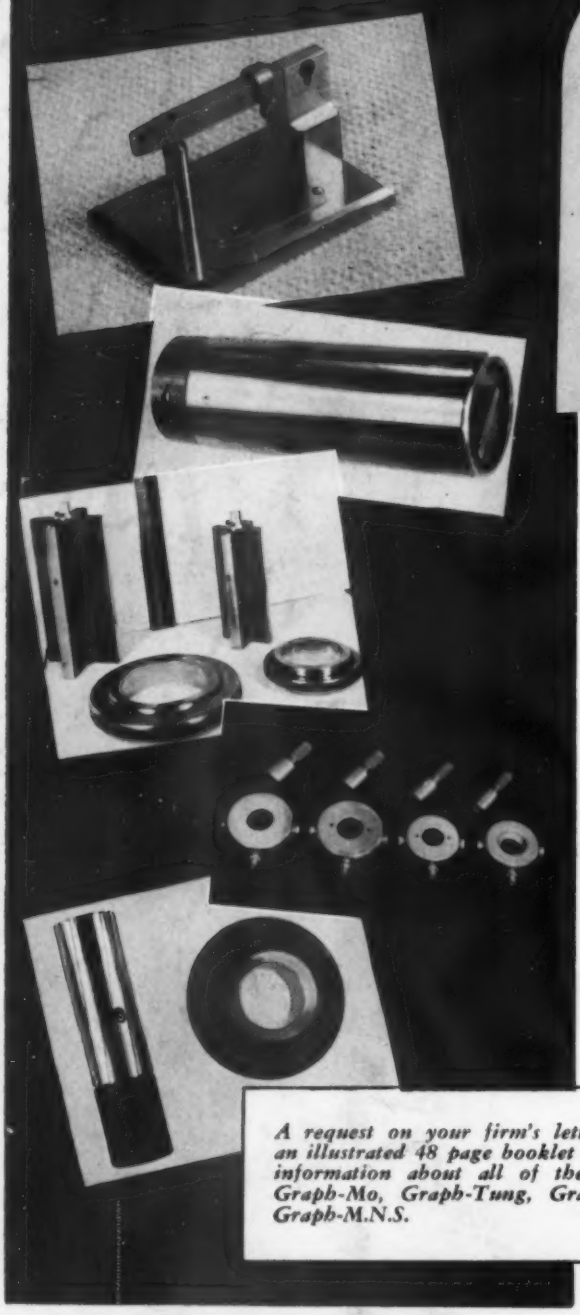
● *New Britain builds a complete line of Multiple Spindle Chucking Machines . . . four, six and eight spindles up to 10-¼" capacity. Also a complete line of Multiple Spindle Screw Machines to 2-¼" capacity.*

NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

ARMY E NAVY

METRICAL LABORATORIES, INC.





The Metricator, an air-actuated gauge, manufactured by Metrical Laboratories Inc., Ann Arbor, Michigan, is built with an magnification ratio of 1 to 4000. It indicates .001″ to be 4″ on its scale and is accurate to .00001″.

To assure this precise accuracy master gauges and gauging heads used with the Metricator are made of Timken Graph-Mo Steel lapped to exceptionally close tolerances.

Graph-Mo was chosen as the material for master gauges and gauging heads because this performance proven steel has only a minimum of growth enabling gauges to remain accurate and eliminating the necessity for costly repairs.

In addition Graph-Mo has excellent machinability, good response to heat treatment, offers stubborn resistance to wear and has less tendency to seize than competing steels. All excellent qualities that will prove to be good allies in licking the tough competition that lies ahead. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

A request on your firm's letterhead will bring an illustrated 48 page booklet full of good sound information about all of the Graphitic Steels, Graph-Mo, Graph-Tung, Graph-Sil, Graph-Al, Graph-M.N.S.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF

GRAPHITIC STEELS